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ABSTRACT

This set of six modules was designed for use primarily by health occupations teachers to help them teach and reinforce the basic science skills in their classes. Each module consists of an introductory page on which the teaching unit, training activities, unit objectives, and related competencies can be found. Most modules include worksheets to reinforce the content of that module. (Answer sheets for the worksheets have not been provided.) Modules can be given to students as complete assignments or broken into smaller units according to the needs of the students. Modules cover the following topics: parts of the body, nutrition, metrics in medicine, the skin, respiration, and health risk appraisal and health awareness games. A matrix of science competencies matched to the related health occupations competencies is included with the set of modules. (KC)

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SCIENCE COMPETENCIES

FOR

HEALTH OCCUPATIONS EDUCATION

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To Teachers:

This set of modules was designed for use primarily by Health Occupations teachers to help them teach and reinforce the basic science skills in their classes. The modules are based on the competencies from HOE I (7931) and HOE II (7932) that require knowledge of related science competencies. It is hoped that science teachers will find the modules useful in reinforcing science skills and in helping students realize the relationship between science and health occupations' studies.

Each module consists of an introductory page on which the Teaching Unit, Training activities, Unit Objectives and, Related Competencies can be found. Most modules include work sheets to reinforce the content of that module. Answer sheets for the worksheets have NOT been provided. Teachers are requested to complete an answer sheet at the time the module is reviewed. Modules that require C.A.I. or slide/tape can be ordered through the Department of Public Instruction's Media Support Services, 500 Vaughn Court, Raleigh, N.C. 27611. Modules may be given to students as complete assignments or broken into smaller units according to the needs of the students.

A "Matrix" of science competencies matched to the related health occupations competencies for H.O. I 7931 and H.O. II 7932 is included. This set of competencies is the combined result of a survey of both science and H.O. teachers, and reflects input from science and H.O. consultants at the Department of Public Instruction and N.C. State University. We hope that you will use the matrix to help clarify the relationship that exists between health occupations and science competencies to all concerned.

Vocational Education Program: Health Occupations Education
HOE I 7931

COMPETENCY STATEMENTS ANALYZED FOR SCIENCE CONTENT

Unit I. Orientation to the Health Care Occupations and Agencies

- Translate health concepts as related to health maintenance and health care
- Interpret health agencies functions
- Analyze job functions and traits of health team members
- Demonstrate behaviors indicative of health team professional ethics and legal responsibilities
- Analyze personal philosophy as it relates to occupational phyilosophy
- Translate medical terminology into lay terms/meanings
- Describe the use of the apothecary/metric systems as it relates to health care/ health maintenance

SCIENCE SKILLS

- Accept that uncertaintities underlie many of the so-called laws of science (including medical sciences)
- Understand how scientists obtain knowledge (observing, measuring, predicting, communicating, interpreting data, controlling variables, and formulating hypotheses)
- Have a positive attitude toward the role of science in helping people meet their responsibilities to society
- Have a positive attitude toward the contributions of science and technology in shaping the world with adverse and beneficial effects
- Have a positive attitude toward the use of scientific inquiry as a way of thinking and evaluating all human activity
- Have an appreciation for the historical background of science
- Understand the importance of accuracy and precision in scientific work
- Have the ability to infer
- Have the ability to predict
- Have the ability to interpret data
- Have the ability to classify according to similarities
- Have the ability to formulate models
- Observe, interpret data, draw conclusions and define operationally
- Understand the implications of social/ethical biology
- Understand the importance of caring for the body through proper nutrition, health and sanitary practices
- Have a postive attitude toward the need for conservation, preservation and, wise use of natural resources
- Know that the earth is a closed system in space with limited resources
- Understand the implications of humans in their environment
- Understand that people interact with the environment and produce change
- Understand the nature of populations
- Understand the nature of commnities
- Understand the nature of humans in their environment
- Understand that a community is made up of interacting populations
- Understand that machines are devices that assist in doing work
- Understand that matter exists in 3 states: solids, liquids, gases
- Understand that the metric system is the preferred measuring system in science

Unit II. Interpersonal Communication and Human Relations

- •Demonstrate verbal and non-verbal communication techniques
- •Demonstrate observation techniques as utilized in communication
- •Demonstrate "active listening" techniques
- •Identify communication responses according to functional and non-functional characteristics
- •Execute basic skills in following directions and/or instructions
- •Describe the components of the helping process
- •Evaluate hypothetical situations involving the helping process
- •Identify personal behavioral traits as they relate to heredity and environmental influences
- •Interpret behavioral patterns in meeting personal needs
- •Analyze the use of defense mechanisms as related to emotional adjustment
- •Identify alternatives to resloving problems using the problem-solving process
- •Evaluate the harmful effects of alcohol, drugs, and tobacco
- •Analyze hypothetical behavioral patterns related to health problems and/or concerns
- •Demonstrate basic coping behavioral patterns of the health team as related to health problems and/or concerns
- •Demonstrate basic coping behavioral patterns of the health team as related to health problems and/or concerns

SCIENCE SKILLS

- •Have a positive attitude toward the role of science in helping people meet their responsibilities to society
- •Apply critical thinking the use of scientific when given a scientific problem
- •Understand the importance of using a scientific method as a way of solving everday problems
- •Use scientific inquiry model as a way of thinking and evaluating all human activity
- •Observe, interpret data, draw conclusions and define operationally
- •Understand how scientists obtain knowledge (observing, meesuring, predicting, communicating, interpreting data, controlling variables, and formulating hypotheses)
- •Have a positive attitude toward the use of scientific inquiry as a way of thinking and evaluating all human activity
- •Have the ability to transmit observable data
- •Have the ability to observe and identify similarities and differences using the senses
- •Have the ability to infer
- •Have the ability to predict
- •Have the ability to formulate hypotheses
- •Understand the implications of social/ethical biology
- •Have the ability to communicate
- •Understand that living things exist in a state of interdependence
- •Understand the implications of humans in their environment
- •Understand that each organism has a special structure by which to adapt to its surroundings
- •Understand that most organisms have undergone change
- •Understand that normal covers a wide range
- •Understand that all organisms exhibit behavior (response to stimuli)
- •Understand that all communities have common characteristics
- •Understand that people interact with the environment and produce change

- Understand the nature of populations
- Understand the nature of communities
- Understand the nature of humans in their environment

Unit III. Nutrition and Diet Therapy

- Classify foods according to nutrients
- Describe nutritive deficiencies
- Discuss basic therapeutic diets as a means of treating major diseases/disorders
- Describe emotional adjustments to therapeutic diets
- Identify health team members whose major function is related to nutrition and diet therapy

SCIENCE SKILLS

- Understand how scientists obtain knowledge (observing, measuring, predicting, communicating, interpreting data, controlling variables, and formulating hypotheses)
- Have a positive attitude toward the use of scientific inquiry as a way of thinking and evaluating all human activity
- Have a positive attitude toward the role of science in helping people meet their responsibilities to society
- Use the scientific method in both laboratory work and solving everyday problems
- Have the ability to infer
- Have the ability to observe and identify
- Have the ability to classify
- Have the ability to transmit observable data
- Have the ability to predict
- Have the ability to interpret data
- Observe, interpret data, draw conclusions and define operationally
- Understand the importance of caring for the body through proper nutrition, health and sanitary practices
- Have a postive attitude toward the need for conservation, preservation and, wise use of natural resources
- Understand that life is a chemical process
- Have an awareness of various aspects of biochemistry
- Understand human physiology and anatomy
- Understand that the body is composed of various systems with specific structures and functions
- Understand that normal covers a wide range
- Understand that the energy available from food is expressed as calories
- Understand characteristics which are the basis for classifying plants and animals
- Identify examples of food chains
- Recognize chemistry as an experimental science
- Understand the relationship between matter and energy for both chemical and physical changes
- Understand factors affecting the rate of a reaction
- Understand that matter exists in 3 states: solids, liquids and, gases
- Understand the importance of accuracy and precision in scientific work
- Understand that temperature is a measure of the intensity of heat in a material at a given time
- Have the ability to measure accurately length, area, volume, mass, weight, and temperature and record the measurments as precisely as the measuring devices permit

- Have the ability to use measuring devices
- Understand that machines are devices that assist in doing work
- Use and care for instruments
- Have skill in how to care for instruments when using and storing them

Unit IV. Basic Sciences

- Use the microscope
- Discuss the major groups of microorganisms according to size, shape, and funtion
- Identify direct and predisposing factors related to diseases/disorders
- Examine the body's defense against diseases/disorders through immunity
- Demonstrate basic microbial controls
- Discuss the general structural plan of the human body
- Analyze the cells, tissues, and organs as related to the body systems
- Differentiate between the body cavities
- Identify body directions and/or planes
- Analyze the structure and function of the integumentary system as they relate to the treatment of major diseases and disorders associated with the system
- Discuss health careers related to dermatology
- Analyze the structure and function of skeletal organs as they relate to the diagnosis and treatment of the major diseases and disorders associated with the system
- Interpret the interdependence of the musculoskeletal system
- Demonstrate the basic body mechanics
- Discuss health careers related to the muscular system
- Analyze the structure and function of the respiratory system as they relate to the treatment of major diseases and disorders associated with the system
- Discuss health careers related to the respiratory system
- Analyze the components and characteristics of the blood as they relate to the diagnosis and treatment of the major diseases/disorders associated with the blood
- Analyze the circulation of blood through the blood vessels as it relates to the diagnosis and treatment of the major diseases and disorders of the heart and blood vessels
- Discuss health careers related to the circulatory system
- Analyze the structure and function of the nervous system as they relate to the treatment of major diseases and disorders associated with the system
- Demonstrate a reflex action
- Differentiate between behaviors related to the sympathetic and parasympathetic nervous systems
- Discuss health careers related to the nervous system
- Anaylze the structures from which the senses eminate and their functions as they relate to the diagnosis and treatment of major diseases and disorders associated with the sensory system
- Discuss health careers related to the sensory system
- Analyze the structure and function of the digestive system as they relate to the treatment of major diseases and disorders associated with the system
- Trace the path of food including the digestive, metabolic, and absorption processes
- Discuss health careers related to the digestive system
- Analyze the structure and function of the urinary system as they relate to the treatment of major diseases and disorders associated with the system
- Analyze the normal and abnormal constituents of urine
- Discuss health careers related to the urinary system
- Analyze the structure and function of the endocrine system as they relate to the

treatment of major diseases and disorders associated with the system
•Relate the interdependence of the total body's function to the endocrine system
•Discuss health careers related to the endocrine system
•Analyze the structure and function of the male reproductive system as they relate to the treatment of major diseases and disorders associated with the system
•Analyze the structure and function of the female reproductive system as they relate to the treatment of major diseases and disorders associated with the system
•Explain the sequential development of the fertilized ovum from conception to birth
•Classify births using the terms abortion, miscarriage, and prematurity
•Analyze values related to human sexuality
•Discuss health careers associated with the reproductive system
•Describe first aid/emergency care
•Use basic techniques necessary to administer immediate and temporary care
•Analyze infractions of health and safety regulations
•Discuss health careers related to first-aid/emergency care

SCIENCE SKILLS
•Accept that uncertainties underlie many of the so-called laws of science (including medical science)
•Understand the implications of social/ethical biology
•Understand the importance of using a scientific method as a way of solving everyday problems
•Have a positive attitude toward the role of science in helping people meet their responsibilities to society
•Have a positive attitude toward the use of scientific inquiry as a way of thinking and evaluating all human activity
•Use the scientific inquiry model as a way of thinking and evaluating all human acitivity
•Understand how scientists obtain knowledge (observing, measuring, predicting, communicating, interpreting data, controlling variables, and formulating hypotheses)
•Have the ability to infer
•Have the ability to observe and identify
•Have the ability to classify
•Have the ability to transmit observable data
•Have the ability to predict
•Have the ability to interpret data
•Observe, interpret data, draw conclusions and define operationally
•Have an appreciation of the historical background of science
•Understand that life is a chemical process
•Have an understanding of the various aspects of biochemistry
•Understand human physiology and anatomy
•Understand that all life comes from life (reproduction)
•Understand that the basic unit of life is the cell
•Understand that the simplest animals are composed of one cell
•Understand that living things may be grouped form the simplest to the most complex
•Understand characteristics which are the basis for classifying plants and animals
•Understand that organic variation is significant
•Understand the diversity of living things
•Understand that living things receive characteristics from the parent organism
•Understand that genes composed of DNA are responsible for inherited characteristics
•Understand that what is normal covers a wide range

- Understand that human beings exhibit a period of growth from infancy to adulthood
- Understand that the human body is composed of various systems with specific structures and functions
- Understand that the human body systems are made up of many parts, each having different functions
- Have the ability to measure accurately length, area, volume, mass, weight, and temperature and record the measurments as precisely as the measuring devices permit
- Understand the importance of accuracy and precision in scientific work
- Have the ability to measure within a given degree of accuracy when given appropriate measurment instruments
- Have skill in the use of instruments
- Use and care for instruments
- Have skill in how to care for instruments when using and storing them
- Have the ability to plan experiments and carry them out safely
- Understand the nature of heat
- Understand that temperature is a measure of the intensity of heat in a material at a given time
- Understand the concept of heat transfer
- Have and understanding of light
- Understand how light behaves
- Understand that light exhibits both wave and particle properties
- Have an understanding of sound
- Have a general understanding of wave energy
- Understand that motion of an object can be described by its velocity and/or acceleration
- Know basic laws of force and motion
- Understand abrasion and pressure
- Understand force, energy, and motion
- Understand that electrical energy can be converted into heat and light
- Understand work, energy, power
- Understand that energy is the ability to do work
- Understand that energy from food is expressed as calories
- Understand the importance of conserving energy in the home, school and, industry
- Understand that matter exists in 3 states: solids, liquids, gases
- Understand the importance of acids, bases, and salts in the human body
- Understand the difference between compounds and mixtures
- Understand that compounds can be altered to form new and different compounds
- Recognize chemistry as an experimental science
- Be familiar with evidence of chemical change
- Be familiar with factors affecting the rate of a reaction
- Understand common formulas
- Understand the concept of matter
- Have a basic knowledge of solid-state physics (computer circuitry)
- Understand the importance of electronics to our society
- Understand that the characteristics of materials used in equipment are determined by their chemical properties
- Understand that machines are devices that assist in doing work
- Understand that each organism has special structures by which to adapt to its surroundings
- Understand the nature of human origin and development
- Understand that mental development of human beings continues throughout adulthood

- Have a postive attitude toward the need for conservation, preservation and wise use of national resources
- Have an understanding of caring for the body through proper nutrition, health and sanitary practices
- Describe how disease-causing organisms enter the body such as through water, food, air and, skin
- Understand viruses, bacteria, and fungi
- Understand that people interact with the envrionment and produce change
- Understand that living things exist in a state of interdependence

Vocational Education Program: Health Occupations Education
Course: Health Occupations Education II - 7932

COMPETENCY STATEMENTS ANALYZED FOR SCIENCE CONTENT

A. Being a Member of a Health Team

001. Analyze the role of the assistant on the health them as related to health career ladders/specialties and duties.

SCIENCE SKILLS
- Have a positive attitude toward the role of science in helping people meet their responsibilities to society
- Have an appreciation for the historical background of science
- Understand the nature of humans in their environment
- Have an understanding of the diversity of living things
- Understand that all organisms exhibit behavior (response to stimuli)
- Understand that living things exist in a state of interdependence
- Have the ability to observe and identify
- Have the ability to classify
- Have the ability to predict
- Have the ability to formulate models
- Observe, interpret data, draw conclusions, and define operationally
- Have a positive attitude toward the use of scientific inquiry as a way to thinking and evaluating all human activity

002. Analyze the role of the assistant on the health team as related to ethical and legal jurisprudence.

SCIENCE SKILLS
- Understand that people react with environment and produce change
- Understand that all organisms exhibit behavior (response to stimuli)
- Understand the implications of humans in their environment
- Understand the implications of soical/ethical biology
- Have the ability to formulate models
- Have a postive attitude toward the use of scientific inquiry as a way of thinking and evaluating all human activity

003. Analyze the role of the assistant on thehalth team as related to professional traits.

SCIENCE SKILLS
- Have the ability to observe and identify
- Observe, interpret data, draw conclusions and define operationally
- Have the ability to formulate models
- Have a postive attitude toward the use of scientific inquiry as a way of thinking and evaluating all human activity

004. Evaluate employment opportunities

SCIENCE SKILLS
- Have the ability to understand how scientists obtain knowledge

- Have the ability to observe and interpret data
- Have the ability to formulate models
- Have a postive attitude toward the use of scientific inquiry as a way of thinking and evaluating all human activity
- Understand that energy is the ability to do work
- Understand work, energy, and power
- Understand that machines are devices that assist in doing work
- Identify work and nonwork situations
- Understand the nature of humans in their environment
- Understand that people interact with the environment and produce change
- Understand the nature of communities

005. Apply the oral/written process necessary for obtaining employment.

SCIENCE SKILLS
- Understand the importance of using a scientific method as a way of solving many everyday problems
- Have the ability to communicate
- Identify work and nonwork situations
- Understand that energy is the ability to do work
- Understand work, energy, and power
- Understand that machines are devices that assist in doing work
- Understand the importance of accuracy and precision in work
- Have the ability to use instruments
- Have the ability to care for instruments when using and storing them
- Have a basic knowledge of solid-state physics (computer circuits)
- Use basic electronic circuitry (computers,etc.)
- Understand the importance of electronics to our society
- Understand that living things exist in a state of interdependence

006. Apply the admissions' process necessary for enrolling in post-secondary education.

SCIENCE SKILLS
- Have the ability to communicate
- Have the ability to use instruments
- Have the ability to care for instruments when using and storing them
- Have a basic knowledge of solid-state physics (computer circuits)
- Understand the importance of electronics to our society
- Understand that machines are devices that assist in doing work
- Understand the importance of accuracy and precision in work
- Understand that living things exist in a state of interdependence
- Understand that mental development of human beings continues throughout adulthood

007. Utilize appropriate medical terminology as a means of communicating and understanding the health care delivery system.

SCIENCE SKILLS
- Have the ability to communicate
- Understand the nature of humans in their environment
- Understand the nature of populations

•Have a positive attitude toward the role of science in helping people meet their responsibilities to society

008. Utilize the apothecaries'/metric system as a means of computing and transcribing measurements.

SCIENCE SKILLS
•Have the ability to measure accurately length, area, volume, mass, weight, temperature, and record the measurements as precisely as the measuring devices permit
•Understand that the metric system is the preferred measuring system in science
•Understand that matter exists in three states: liquids, solids, gases
•Understnd compounds and mixtures
•Be familiar with evidence of chemical change
•Understand that compounds can be altered to form different and new compounds
•Understand the mechanics of fluids
•Understand that temperature is a measure of the intensity of heat in a material at a given time
•Understand the importance of acids, bases, and salts in the human body
•Have the ability to use instruments
•Have skill in how to care for instruments when using and storing them
•Have an understanding of the importance of caring for the body through proper nutrition, health and sanitary practices
•Have a postive attitude toward the contributions of science and technology in shaping the world adverse as well as benefical effects
•Understand the importance of accuracy and precision in work

B. COMMUNICATION SKILLS

009. Utilize listening skills as related to purposeful communications

SCIENCE SKILLS
•Have the ability to communicate
•Have the ability to observe
•Understand the nature of humans in their environment

010. Utilize observation skills as related to purposeful communications

SCIENCE SKILLS
•Have the ability to observe
•Have the ability to infer
•Have the ability to transmit observable data
•Observe, interpret data, draw conclusions and define operationally
•Have the ability to communicate

011. Utilize empathetic responses

SCIENCE SKILLS
•Have the ability to communicate
•Observe, interpret data, draw conclusions and define operationelly

012. Apply anticipatory behavior patterns

SCIENCE SKILLS
•Have the ability to observe and identify
•Have the ability to predict
•Have the ability to interpret data

013. Greet patients, clients, and health team members in a positive manner.

SCIENCE SKILLS
•Have the ability to communicate
•Understand the nature of humans in their environment
•Have the ability to observe and identify
•Understand that all organisms exhibit behavior (response to stimuli)
•Understand the implications of humans in their environment
•Observe, interpret data, draw conclusions and define operationally

014. Inform accurately patients, clients, and health team members on the assistant level

SCIENCE SKILLS
•Have the ability to communicate
•Understand the nature of humans in their environment
•Understand that all organisms exhibit behavior (response to stimuli)
•Understand the importance of accuracy and precision in work

015. Place and receive telephone calls

SCIENCE SKILLS
•Have the ability to communicate
•Have the ability to use instruments
•Have skill in how to care for instruments when using and storing them
•Understand that people interact with the environment and produce change

016. Receive and follow directions

SCIENCE SKILLS
•Have the ability to communicate
•Understand the importance of accuracy and precision in work
•Understand that people interact with the environment and produce change
•Observe, interpret data, draw conclusions and define operationally

017. Interview patients and clients

SCIENCE SKILLS
•Understand that all organisms exhibit behavior (response to stimuli)
•Understand the implications of humans in their environment
•Have a postive attitude toward the role of science in helping people meet their responsibilities to society
•Understand that each organism receives characteristics from parent organisms

•Understand that each organism has special structures by which to adapt to its surroundings
•Have the ability to observe and interpret data
•Observe, interpret data, draw conclusions and define operationally

C- ASSITANT HEALTH CARE SKILLS I

018. Handle mail within a health agency

SCIENCE SKILLS
•Understand the importance of accuracy and precision in work
•Have the ability to classify
•Have the ability to observe and identify
•Have the ability to observe and interpret data
•Have the ability to use equipment
•Have the ability to use instruments
•Have skill in how to care for instruments when using and storing them

019. Maintain files/records within a health agency.

SCIENCE SKILLS
•Understand the importance of accuracy and precision in work
•Have a basic knowledge of solid-state physics (computer circuits)
•Use basic electronic circuitry (computers,etc.)
•Have the ability to use instruments
•Have skill in how to care for instruments when using and storing them
•Have the ability to communicate
•Have the ability to interpret data
•Have the ability to classify
•Have the ability to analyze, evaluate, interpret data, and draw appropriate conclusions

020. Schedule appointments for patients, clients, and health team members.

SCIENCE SKILLS
•Understand the importance of accuracy and precision in work
•Have the ability to communicate
•Understand that machines are devices that assist in doing work
•Have a basic knowledge of solid-state physics (computer circuits)
•Use basic electronic circuitry (computers,etc.)
•Have the ability to use instruments
•Have skill in how to care for instruments when using and storing them
•Observe, interpret data, draw conclusions and define operationally

021. Complete medical/health forms and requisitions based on information

SCIENCE SKILLS
•Understand the importance of accuracy and precision in work
•Have the ability to communicate
•Have the ability to observe and interpret data
•Have the ability to transmit observable data
•Have the ability to classify
•Have the ability to analyze, evaluate, interpret data, and draw appropriate conclusions
•Have a basic knowledge of solid-state physics (computer circuits)
•Use basic electronic circuitry (computers,etc.)
•Have the ability to use instruments
•Have skill in how to care for instruments when using and storing them

022. Maintain inventories of supplies and equipment in a health agency

SCIENCE SKILLS
•Understand the importance of accuracy and precision in work
•Have the ability to observe and identify
•Develop a positive attitude toward the need for conservation, preservation, and wise use of natural resources
•Have the ability to transmit observable data
•Have the ability to classify
•Understand that machines are devices that assist in doing work
•Have a basic knowledge of solid-state physics (computer circuits)
•Use basic electronic circuitry (computers,etc.)
•Have the ability to use instruments
•Have skill in how to care for instruments when using and storing them

023. Process invoices, statements, and accounts based on given information.

SCIENCE SKILLS
•Have the ability to interpret data
•Have the ability to classify
•Have the ability to analyze, evaluate, interpret data, and draw appropriate conclusions
•Understand the importance of accuracy and precision in work
•Have a basic knowledge of solid-state physics (computer circuits)
•Use basic electronic circuitry (computers,etc.)
•Have the ability to use instruments
•Have skill in how to care for instruments when using and storing them

024. Transcribe/interpret health team members' requests/orders on the assistant level.

SCIENCE SKILLS
•Understand the importance of accuracy and precision in work
•Have the ability to communicate
•Have the ability to observe and interpret data
•Observe, interpret data, draw conclusions and define operationally

025. Prepare working schedules for health team members based on information

SCIENCE SKILLS

- Understand the importance of accuracy and precision in work
- Have the ability to communicate
- Have the ability to observe and identify
- Have a basic knowledge of solid-state physics (computer circuits)
- Use basic electronic circuitry (computers,etc.)
- Have the ability to use instruments
- Have skill in how to care for instruments when using and storing them

026. Admit a patient/client to a health agency

SCIENCE SKILLS

- Understand the nature of humans in their environment
- Understand that people interact with the environment and produce change
- Understand that what is normal covers a wide range
- Understand that most organisms have undergone change
- Have a positive attitude toward the use of scientific inquiry as a way of thinking and evaluating all human activity
- Understand the implications of social/ethical biology
- Understand human anatomy and physiology
- Understand that the human body is composed of various systems with specific structures and functions
- Understand that each organism has special structures by which it adapts to its surroundings
- Understand how disease-causing organisms enter the body
- Understand the importance of caring for the body through proper nutrition, health, and sanitary practices
- Have the ability to measure accurately length, area, volume, mass, weight, temperature, and record the measurements as precisely as the measuring devices permit
- Have the ability to identify similarities and differences using the senses
- Have the ability to use instruments
- Have skill in how to care for instruments when using and storing them
- Understand that the metric system is the preferred measuring system in science
- Have the ability to communicate
- Have the ability to observe and identify
- Have the ability to transmit observable data
- Have the ability to classify according to similarities
- Have the ability to interpret data
- Observe, interpret data, draw conclusions and define operationally
- Understand that all organisms exhibit behavior (response to stimuli)

027. Provide an environment within a health agency that is comfortable, clean, and safe

SCIENCE SKILLS
- Have an understanding of ecology
- Understand how facilities are heated and cooled
- Understand the importance of conserving energy in home, school, and industry
- Understand that temperature is a measure of the intensity of heat in a material at a given time
- Have skill in how to care for instruments when using and storing them

D- ASSITANT HEALTH CARE SKILLS II

028. Apply medical asepsis

SCIENCE SKILLS
- Understand the importance of caring for the body through proper nutrition, health, and sanitary practices
- Understand the characteristics of life
- Understand how disease-causing organisms enter the body such as through water, food, air and skin
- Understand viruses and bacteria

029. Apply surgical asepsis

SCIENCE SKILLS
- Understand the importance of caring for the body through proper nutrition, health, and sanitary practices
- Understand the characteristics of life
- Understand how disease-causing organisms enter the body such as through water, food, air and skin
- Understand viruses and bacteria

030. Prepare trays/packs for diagnostic and/or therapeutic purposes

SCIENCE SKILLS
- Understand the importance of caring for the body through proper nutrition, health, and sanitary practices
- Understand the nature of heat
- Understand the concept of heat transfer
- Understand how disease-causing organisms enter the body such as through water, food, air and skin
- Understand viruses and bacteria

031. Apply isolation techniques in order to prevent cross infection from communicable diseases/disorders.

SCIENCE SKILLS
- Understand the nature of heat
- Understand the concept of heat transfer
- Understand that living things exist in a state of interdependence

•Understand the importance of accuracy and precision in work
•Understand human physiology and anatomy
•Understrand viruses and bacteria

032. Apply transportation measures using wheelchair, stretcher, hydraulic lift, and emergency devices.

SCIENCE SKILLS
•Understand basic laws of force and motions
•Understand that motion of an object can be described by its velocity and/or acceleration
•Understand that machines are devices that assist in doing work
•Understand that the characteristics of materials used in equipment are determined by their chemical properties
•Have the ability to use equipment

033. Assess a patient's/client's physical appearance

SCIENCE SKILLS
•Understand human physiology and anatomy
•Understand the importance of accuracy and precision in work
•Understand that living things receive characteristics from the parent organism
•Understand that all life comes from life
•Understand that genes composed of DNA are responsible for inherited characteristics
•Understand that the human body systems are made up of many parts, each having different functions
•Understand that each organism has special structures by which to adapt to its surroundings
•Understand that most organisms have undergone change throught time
•Understand the diversity of living things
•Understand that what is normal covers a wide range
•Have the ability to observe and identify
•Have the ability to classify according to similarities
•Have the ability to transmit observable data
•Have a postive attitude toward the use of scientific inquiry as a way of thinking and evaluating all human activity

034. Determine/record weight, height, and visual acuity

SCIENCE SKILLS
•Understand the importance of accuracy and precision in work
•Understand how light behaves
•Have the ability to identify similarities and differences using the senses
•Have the ability to observe and interpret data
•Have the ability to transmit observable data
•Have the ability to use instruments
•Have the ability to care for instruments when using and storing them
•Understand the importance of caring for the body through proper nutrition, health, and sanitary practices
•Have a positive attitude toward the use of scientific inquiry as a way of thinking and evaluating all human activity

•Understand that all organisms exhibit behavior (response to stimuli)
•Have the ability to communicate

035. Obtain/chart vital signs

SCIENCE SKILLS
•Understand the importance of accuracy and precision in work
•Have the ability to identify similarities and differences using the senses
•Have the ability to observe and interpret data
•Have the ability to transmit observable data
•Understand the nature of heat
•Understand that temperature is a measure of the intensity of heat in a material at a given time
•Understand human physiology and anatomy
•Understand that all organisms exhibit behavior (response to stimuli)
•Have the ability to communicate
•Have a positive attitude toward the use of scientific inquiry as a way of thinking and evaluating all human activity
•Understand the importance of caring for the body through proper nutrition, health, and sanitary practices

036. Position/align body parts

SCIENCE SKILLS
•Understand human physiology and anatomy
•Understand the nature of human origin and development
•Understand abrasion and pressure
•Have the ability to observe and identify
•Have the ability to identify similarities and differences using the senses
•Understand that most organisms have undergone change
•Have the ability to communicate
•Understand that all organisms exhibit behavior (response to stimuli)
•Understand the importance of caring for the body through proper nutrition, health, and sanitary practices
•Understand that what is normal covers a wide range

037. Handle specimens, cultures, smears

SCIENCE SKILLS
•Have the ability to communicate
•Understand human anatomy and physiology
•Have an understanding of the importance of caring for the body through proper nutrition, health, and sanitary practices
•Understand the nature of heat
•Understand that temperature is a measure of the intensity of heat in a material at a given time
•Have the ability to observe and identify
•Have the ability to identify similarities and differences using the senses
•Have the ability to transmit observable data

•Understand that what is normal covers a wide range
•Understand the importance of accuracy and precision in work
•Understand viruses and bacteria

038. Compute/describe liquids and solids

SCIENCE SKILLS
•Understand that the metric system is the preferred measuring system in science
•Understand that matter exists in 3 states: solids, liquids, gases
•Understand the difference between compounds and mixtures
•Understand the importance of accuracy and precision in work
•Have the ability to measure accurately length, area, volume, mass, weight, temperature and record the measurements as precisely as the measuring devices permit
•Have the ability to use instruments
•Have skill in how to care for instruments
•Have skill in how to care for instruments when using and storing them

039. Assist in applying/removing dressings and bandages

SCIENCE SKILLS
•Have the ability to observe and identify
•Have the ability to transmit observable data
•Understand human anatomy and physiology
•Understand that all organisms exhibit behavior (response to stimuli)
•Have an understanding of the importance of caring for the body through proper nutrition, health, and sanitary practices
•Have the ability to use instruments
•Have skill in how to care for instruments when using and storing them
•Understand that what is normal covers a wide range
•Understand the importance of accuracy and precision in work
•Understand viruses and bacteria

040. Assist in applying heat and cold

SCIENCE SKILLS
•Understand human physiology and anatomy
•Understand the nature of heat
•Understand the concept of heat transfer
•Understand that all organisms exhibit behavior (response to stimuli)
•Have the ability to communicate
•Have the ability to observe
•Have the ability to transmit observable data

041. Assist in administering therapeutic agents

SCIENCE SKILLS
•Understand human physiology and anatomy
•Understand the characteristics of life
•Understand the importance of acids, bases, and salts in the human body
•Understand the mechanics of fluids

•Have the ability to communicate
•Have the ability to observe and identify
•Have the ability to transmit observable data
•Understand that all organisms exhibit behavior (response to stimuli)
•Understand how disease-causing organisms enter the body such as through water, food, air, and skin

042. Assist in administering hygienic care

SCIENCE SKILLS
•Understand human physiology and anatomy
•Have an understanding of the importance of caring for the body through proper nutrition, health, and sanitary practices
•Have the ability to observe and identify
•Have the ability to transmit observable data
•Understand that all organisms exhibit behavior (response to stimuli)
•Understand how disease-causing organisms enter the body such as through water, food, air, and skin
•Understand viruses and bacteria

043. Assist in administering therapeutic diets/supplements

SCIENCE SKILLS
•Have an understanding of the importance of caring for the body through proper nutrition, health, and sanitary practices
•Understand the characteristics of life
•Understand human physiology and anatomy
•Understand an awareness of various aspects of biochemistry
•Understand that life is a chemical process
•Understand that the energy available from food is expressed as calories
•Have the ability to use measuring devices
•Recognize chemistry as an experimental science
•Be familiar with evidence of chemical change
•Understand viruses and bacteria
•Understand how disease-causing organisms enter the body such as through water, food, air, and skin

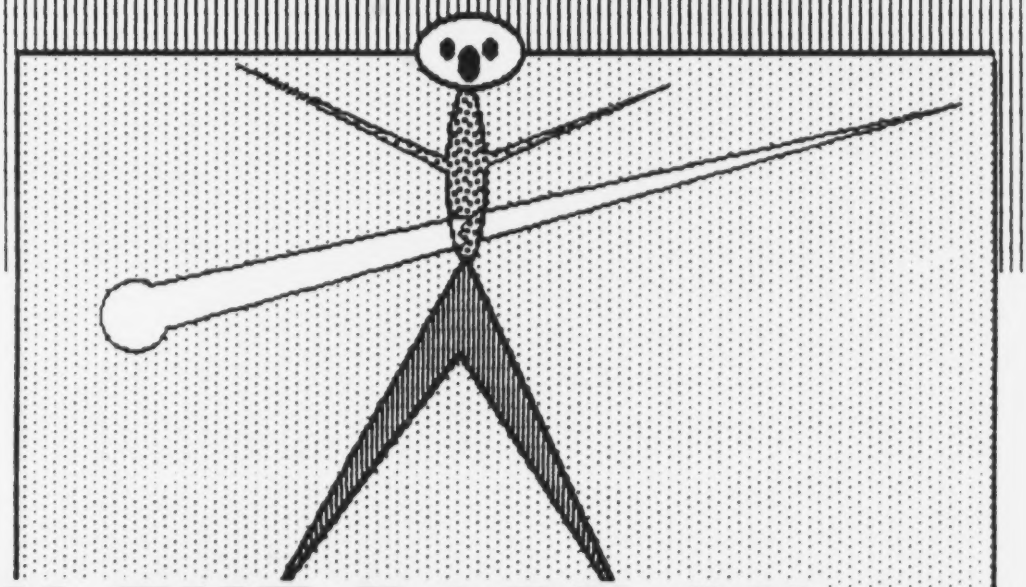
044. Assist in administering active/passive excercises

SCIENCE SKILLS
•Understand human physiology and anatomy
•Understand that what is normal covers a wide range
•Understand abrasion and pressure
•Understand basic laws of force and motion

045. Assist in ambulation with and without the use of devices

SCIENCE SKILLS
- Understand basic laws of force and motion
- Understand that motion of an object can be described by its velocity and/or acceleration
- Understand human anatomy and physiology
- Understand that most organisms have undergone changes through time
- Understand that living things exist in a state of interdependence
- Understand that all organisms exhibit behavior (response to stimuli)
- Have the ability to communicate
- Understand that each organism has special structures by which to adapt to its surroundings
- Understand the nature of humans in their environments
- Understand the implications of humans in their environment
- Understand that machines are devices that assist in doing work
- Have the ability to use equipment
- Have a positive attitude toward the role of science in helping people meet their responsibilities to society

Funded under a contract through the Research Coordinating Unit, Division of Vocational Education, Department of Public Instruction, under the auspices of federal law 94-482 FY 1985



PIN THE PART ON THE PERSON

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Pin The Part On The Person Introduction

Teaching Unit: **Body Systems and Functions**

Training Activities:

(1) Studying the modules for content and application to health careers.

(2) Answering the questions related to each module.

Unit Objectives:

(1) To provide experiences for identification of the structure of the body's major systems and the organs that compose those systems.

(2) To present science concepts involving the sturcture and function of the human body that help to strengthen those concepts taught in Health Occupations.

Related Competencies:

[Science Competencies Needed]-

1- The learner will understand that the human body is composed of various systems with specific structures and functions

2- The learner will be able to name and describe the major structures and functions of all the main body systems: skeletal,muscular,integumentary,digestive, respiratory, nervous, excretory, reproductive, circulatory, and endocrine.

3- The learner will understand that the basic unit of living things is the cell.

4- Label and describe the major organs of each major system of the human body.

[Health Occupations 7931 Unit IV]

1- The learner will be able to analyze the structure and function of the body's systems as they relate to diagnosis and treatment of the major diseases and disorders associated with that system.

The body = a structural unit composed of many smaller units.

It is easy to understand the idea of a large unit made up of smaller ones. A city, for example, is made up of a downtown area, shopping districts, and neighborhoods; office buildings, stores and houses; and lots of people moving about on highways, roads and streets that connect the entire system. A hospital, school, or church is also a large unit made up of smaller units. So, also, is a car, a sewing machine, and a computer. In each instance, the large unit is not just a collection of the smaller units but is something more than the sum of its parts. This is a result of the way the smaller units are related to each other. The way smaller units are organized to make the large unit more than its parts is a description of the structure and function of those units.

The body is arranged in a similar manner. It is a large unit made up of smaller units, each with a specific structure and function that work together to make something much more than the sum of its parts. That something more is a healthy life. When the parts of any unit do not function properly, this creates disorganization in the unit. Disorganize any large unit, break it into its separate parts, no longer arranged in a definite pattern, and you have a lesser thing than before. Consider, for example the difference between jigsaw puzzle, and its disassembled pieces. The assembled jigsaw puzzle, because of the organization or arrangement of the units that compose it, is an integrated whole. Similarly, the body, because of the organization of its component units, is an integrated whole.

Organization underlies integration (unification) of parts. Because organization welds separate part together to form a whole, it is a foundation and a vital part of life. Disorganization of the units that compose the body produce disintegration and lead to disease and death.

The units that make up the body

There are millions of units that make up the the body. The smallest units are those called cells. Human cells are microscopic structures; that is, they can be seen only when magnified by a microscope. They are invisible to the unassisted eye. Cells are not all alike. There are four main types of human cells: (1) epithelial, (2) muscle, (3) connective, and (4) nerve. Organizations of large numbers of similar cells are called tissues. Unlike cells, tissues are macroscopic structures; that is, they are visible to the unassisted eye.

The organization of tissues into larger units called organs is the next step toward making the whole person. The stomach is an example of an organ that is made up of three different units of tissues in a specialized pattern. Muscle and connective tissue are arranged to form the wall of this

hollow organ. Epithelial and connective tissues are organized into a lining for the inside of the wall, and nerve tissue is distributed to both wall and lining.

The next step toward the putting together of the human unit is the organization of organs into systems. For example, the digestive system is made up of the mouth, pharynx, esophogus, stomach, and intestines. In the human body there are generally said to be ten major organ systems: (1) Skeletal, (2) Muscular, (3) Nervous, (4) Circulatory, (5) Respiratory, (6) Digestive, (7) Urinary, (8) Reproductive, (9) Endocrine systems, and (10) Integumentary.

Structure and function of body systems

1) The Skeletal system- The basic framework of the body.
Over 200 bones connected by joints. Powered by the muscles, the bones move the body in a variety of directions. Main functions: a) furnishes supporting framework for body; b) affords protection; c) provides levers for muscle action; d) hematopoiesis (making red blood cells) by red bone marrow; e) calcium storage.

2) The Muscular System- Body movements are due to the action of the muscles which are attached to the bones. Other types of muscles are present in the walls of such organs as the stomach, intestines, and heart. The combination of bones, joints, muscles and connective tissues is known as the musculoskeletal system. Main functions: a) movement- locomotion and fine and gross motor movements; b) posture; c) heat production.

3) The Circulatory system- The heart, blood vessels, lymph vessels and lymph nodes all make up the system whereby blood is pumped to all the body tissues, bringing with it food, oxygen and other substances, and carrying away waste materials. The blood vessels, together with the four chambers of the heart, form a closed system for the flow of blood. Blood will not escape this system unless there is an injury to some part of the wall of the heart or blood vessels.

4- The Digestive system- This system is made up of all organs which have to do with taking food into our body and converting

the useful parts of that food into energy for the body to live. Digestion and absorption are the two main functions of the digestive system. The digestive system is made up of the alimentary canal and the accessory organs. The alimentary canal is the continuous passageway beginning with mouth, where food is taken in, and ending at the anus, where solid waste is discharged as a product of the digestive process. The organs along the alimentary canal in descending order, include the pharynx, esophagus, stomach, small intestine and large intestine. Accessory organs include the liver, the gallbladder, and the pancreas which manufacture various substances needed to regulate food metabolism, serve as storage areas for certain substances which are released as needed, and function in other ways to help maintain a normal state of health. While vital for the digestive process to occur, are not a part of the alimentary canal.

5) The Respiratory system- Supplies oxygen to the individual tissue cells and removes carbon dioxide. This includes the nose, sinuses, lungs, and the passages leading to and from them. Oxygen is carried to body cells by red blood cells through the circulatory system.

6) The Integumentary system- (Skin) The skin is considered a separate body system. It consists of hair, nails, sweat and oil glands, and other related structures. The main purposes of the skin are to: a- regulate temperature; b- prevent bacteria from entering the body; c- excrete waste products such as salt; and, d- contain nerve endings to sense pain, pressure, heat, cold, etc.

7) The Urinary system- Also called the excretory system, its main organs include the kidneys, ureters, bladder and urethra. The major function of this system is to filter out waste products for excretion by the body that are carried by the blood cells.

8) The Endocrine system- These organs, located in various parts of the body, secrete and excrete special chemical substances called hormones, which regulate such body functions as growth,

food utilization within the cells, and reproduction. The

endocrine glands include the thyroid, pituitary, and adrenals.

9) The Nervous system- The brain, spinal cord, and nerves work together in a complex electrochemical process to control and coordinate all body functions. The organs of special sense (eyes, ears, taste buds, and organs of smell) together with the sense of touch control all messages to the brain in the form of impulses. The brain determines the body's response to these messages from without, as well as, those from within. Special functions of memory and reasoning are also located within the brain.

10) Reproductive system- Consists of those organs whose function is to produce a new individual. Some reproductive organs also produce hormones. Male reproductive organs include the testes, seminal vesicles, prostate, and bulbourethral glands, seminal ducts (vas deferens), ejaculatory ducts and urethra. Female reproductive organs include the ovaries, fallopian tubes, uterus, and mammory glands.

Arrangement of the body's units

The human body has a definite structural plan: The backbone, bilateral symmetry, and two main cavities, one on the front or ventral surface of the body, and one on the back or dorsal side of the body. Each of these cavities is divided into smaller cavities or units.

The ventral or front cavity is separated by the diaphragm muscle into (1) a thoracic or chest cavity, which has pleural, pericardial, and mediastinal subdivisions, and (2) an abdominopelvic cavity, which is subdivided into an upper abdominal and lower pelvic portion.

The dorsal or back cavity is divided into (1) a cranial cavity and (2) a spinal cavity.

The body cavities contain the various internal organs or viscera. For example, in the thoracic cavity are located the lungs, heart, trachea, esophagus, thymus gland, and certain large blood and lymphatic vessels and nerves, whereas in the abdominal cavity are located the liver,

gallbladder, stomach, pancreas, intestines, spleen, kidneys, and ureters. The bladder, certain reproductive organs (uterus, uterine tubes, and ovaries in the female; prostate gland, seminal vesicles, and part of the seminal ducts in the male, and part of the large intestine (namely, the sigmoid colon and rectum)) are found in the pelvic cavity.

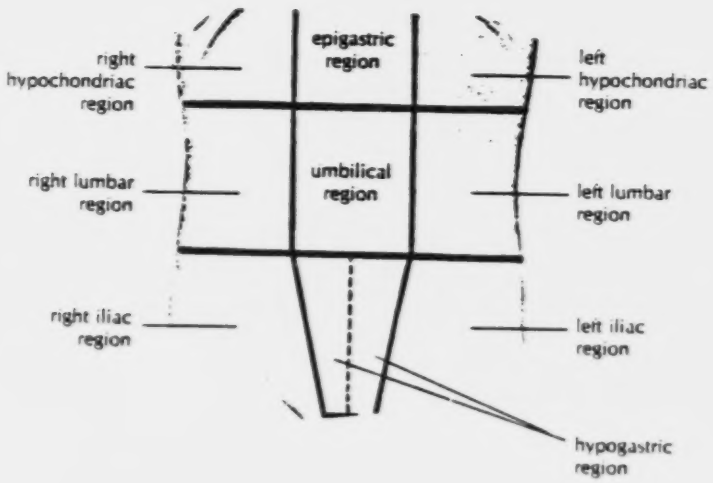
Directional terms of body units

1- Superior- toward the head end of the body; "above" or "in a higher position." For example, the head is superior to the heart.
2- Inferior- away from the head; "lower" or "below". For example, the stomach is inferior to the heart.
3- Anterior or ventral front. Located near the front of the body. For example, the kneecap is located on the anterior side of the leg.
4- Posterior or dorsal back. Refers to locations nearer the back. For example, the shoulder blades are located on the posterior side of the body.
5- Medial or near the midline of the body. For example, the big toe is located on the medial side of the foot.
6- Lateral or away from the midline of the body. For example, the little toe is located on the lateral side of the foot.
7- Proximal toward or nearest the trunk or point of origin of the part. For example, the shoulder is the proximal end of the arm.
8- Distal away from or farthest from the trunk or the point of origin of a part. For example, the fingers are located at the distal end of the hand.
9- Midsagittal plane. A lengthwise plane running from front to back, dividing the body or any part of it into right and left sides.
10- Frontal plane. A lengthwise plane running from side to side, dividing the body, or any part of it into the anterior (front) and posterior (back) portions.
11- Transverse plane. A crosswise plane dividing the body or any part of it into upper and lower parts.

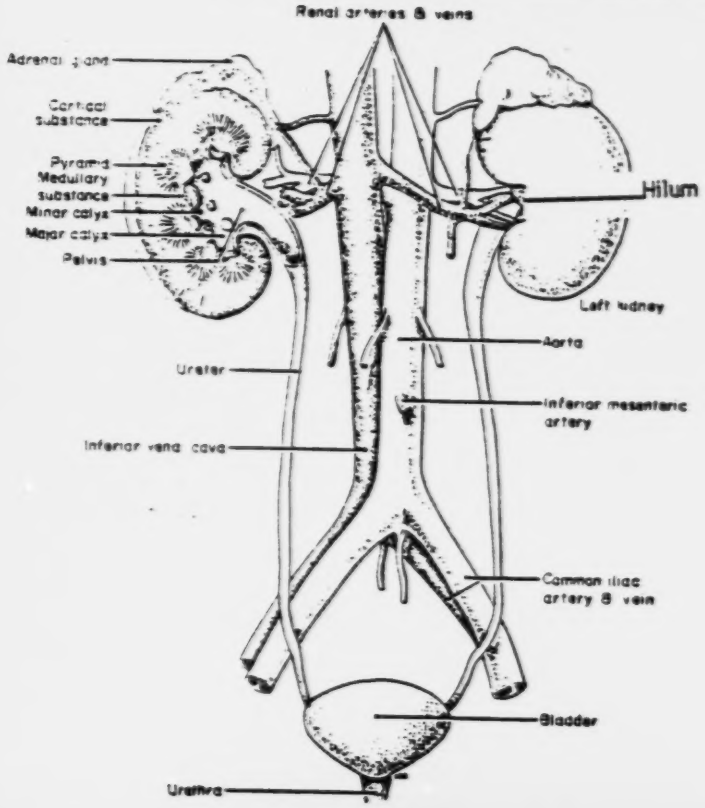
Abdominal regions

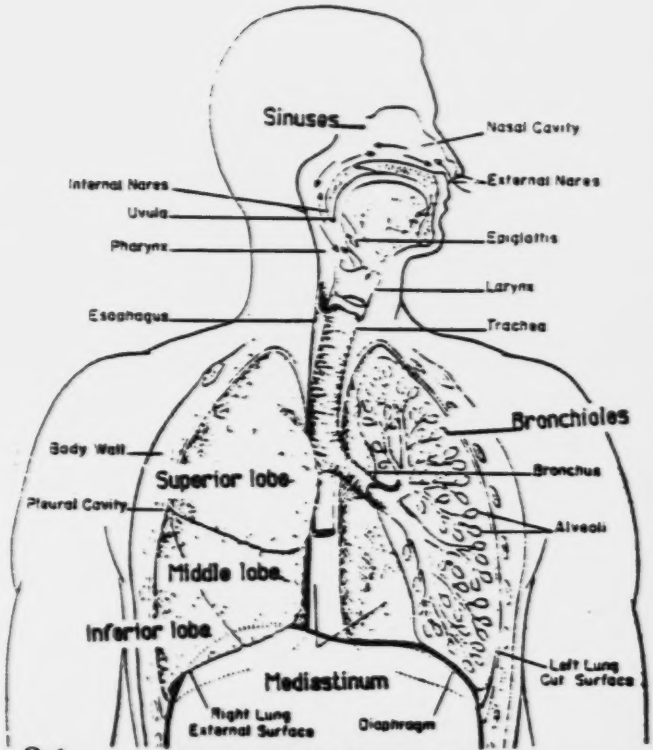
Abdominal regions

Because of its large size, the abdominal cavity has been divided into nine regions. These nine regions are created by four imaginary lines that divide the abdomen into what looks like a tic-tac-toe board. Imagine the following:



Study the following diagrams:





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Worksheet #1 for Pin the Part

1- Arrange the following units of the human body from smallest to largest.
1- organs
2- cells
3- systems
4- tissues
smallest <_____, _____, _____, _____> LARGEST

2- Match the following description with its correct unit.

_____ 1- cells	a) groups of like cells
_____ 2- organs	b) basic units of human structure
_____ 3- tissues	c) groups of organs
_____ 4- systems	d) several kinds of tissues

3- Which of the following is not a main type of human cell?
a) epithelial
b) muscle
c) connective
d) visceral
e) nerve

4- Match the following structures with the system to which they belong.

___ 1- esohpagus	a) urinary
___ 2- trachea	b) endocrine
___ 3- fingernails	c) nervous
___ 4- joints	d) integumentary
___ 5- ureters	e) reproductive
___ 6- pituitary	f) skeletal
___ 7- vas deferens	g) respiratory
___ 8- alimentary canal	h) circularoty
	i) digestive

5- The major function(s) of the integumentary system is to:
a) prevent bacterial invasion
b) regulate temperature
c) produce antibodies
d) all of the above
e) a and b only

6- The major function(s) of the digestive system is to:
a) remove waste from the blood
b) turn food into substances that the body can use for energy
c) provide a place for fat to be stored

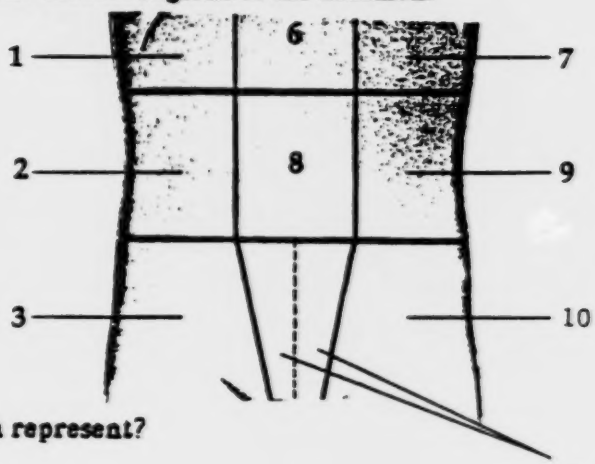
7- The major function(s) of the endocrine system is to:
a) regulate growth
b) produce hormones
c) regulate reproduction
d) all of the above
e) none of the above

(Answer choices for 8- 11 : superior, inferior, anterior, posterior, medial, proximal, distal, lateral, sagittal, transverse)

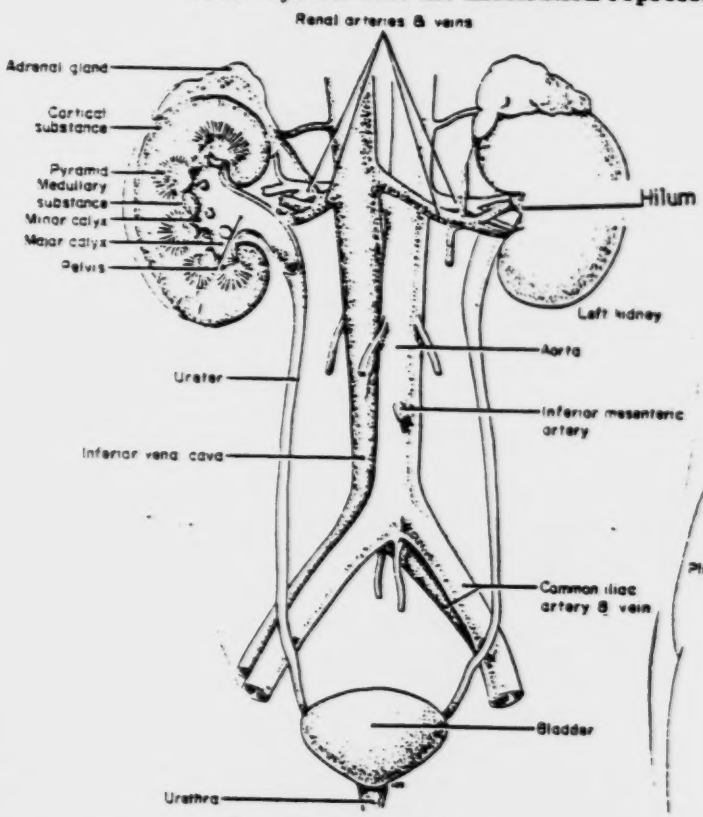
8- The head is _____ to other body areas.
9- A persons eyes are on the _____ side of the head.
10- The hip is at the _____ end of the leg.
11- A lengthwise plane that divides the body into right and left halves is said to be _____.

Fill in the follwing diagram with the correct regions of the abdomen:

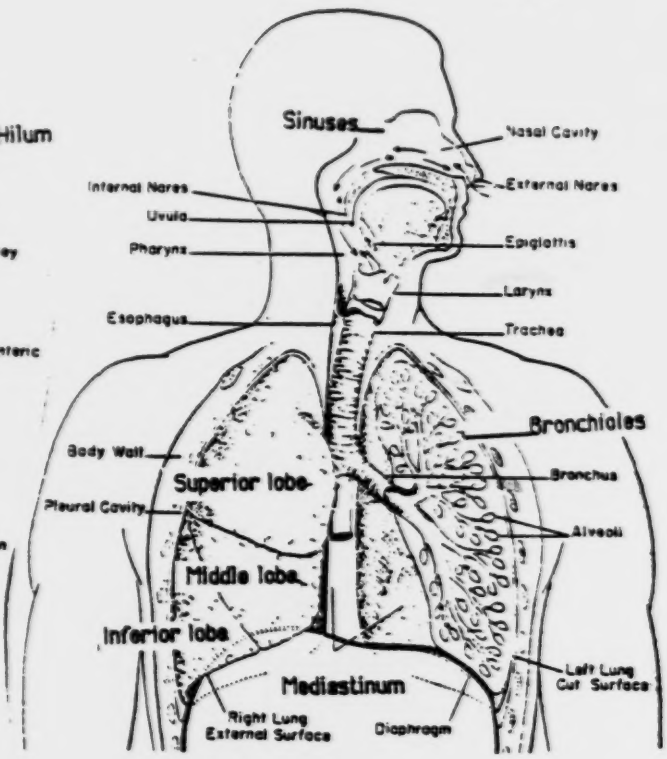
1- _____
2- _____
3- _____
4- _____
5- _____
6- _____
7- _____
8- _____
9- _____
10- _____



Which system does the illustration represent?



System _____



System _____

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Major Organs and their functions in health and illness

We have looked at the major systems of the body as units that function together. Now let's look at some specific organs and how they function within a system to provide life.

Let's start at the top with the **Brain**:

The brain is one of the largest of adult organs. In most adults it weighs about 1350 to 1400 grams (approximately 3 pounds) of which 2% is the spinal cord. The brain generally is smaller in women than in men and in older persons than in younger persons. It gets to be full size by the time a person is 18. It grows rapidly, however, only about the first 9 years of life. If you were to slice the brain in half (along a sagittal plane) you could see many layers and structures. A large soft mass of nerve tissue, the brain is contained in the cranium.

The brain is composed of neurons which are nerve cells and neurologia or supporting cells. The brain consists of gray and white matter. Gray matter is composed mainly of nerve cell bodies and is concentrated in the cerebral cortex and the nuclei and basal ganglia. White matter is composed of nerve cell processes which form tracts connecting different parts of the brain with each other.

The brain consists of 3 parts. From the outermost to the innermost parts they are the: cerebrum, cerebellum and, midbrain which includes the medulla oblongata, and pons. The brain also consists of membranes called Meninges, nerves, and ventricles.

The brain is the main center for regulating and coordinating body activities. Sensory impulses are received and sent through afferent nerves; these register as sensations which are the basis for perception. The brain houses consciousness, thought, memory, reason, judgment, and emotion. Motor impulses are discharged through nerves to muscles and glands causing activity. Through reflex centers, the body's automatic activities are controlled. The most important automatic reflexes are cardiac, vasomotor, and respiratory which regulate circulation of blood and breathing.

Stroke, the sudden onset of paralysis caused by hemorrhage into the brain, formation of embolus or thrombus that blocks off an artery, or rupture of an artery outside of the cerebrum is the leading cause of death associated with the brain. Since the brain is surrounded by bone, it cannot expand beyond the limits of the skull to accommodate bleeding, tumors, or extra fluids. When pressure builds in the brain it is pushed onto itself.

Any tissue that is compressed will not allow normal blood flow to reach it which means that oxygen and food cannot be provided to the cells, nor can CO2 or waste products be removed. That is why tumors, blood, infections and the like are so dangerous in the brain. Unlike organs that can stretch within soft body cavities, the brain is trapped within a solid skull that allows very little room for expansion. A way to remember this idea is THE BRAIN + CEREBROSPINAL FLUID + BLOOD + ANY OTHER SPACE OCCUPYING LESIONS = Intracranial pressure.

Alzheimer's disease is seen in older patients and is generally associated with a shrinking of the brain. It is not known what causes this devastating disease. Eventually, the persons are totally incapable of providing any care for themselves. Feeding, dressing, and even toileting has to be provided. Alzheimer's disease is on the increase as the population of older persons grows.

The Heart:

The heart is a hollow, muscular organ that can expand and contract. It is the center of the circulatory system. It provides the force for circulating the blood throughout the circulatory system. The heart wall is made up of 3 layers: epicardium or outer layer, myocardium or middle layer, and endocardium or inner layer. The endocardium is the heart's lining. The heart is made up of 4 chambers. Each lower chamber is a ventricle and each upper chamber is an atrium. They are classified by right and left atrium and ventricle.

The heart chambers contract to pump blood and then relax. The number of contractions and relaxations a heart goes through in a minute depends on many factors. Age, weight, sex, lifestyle, and previous medical history are just a few things that can affect a person's pulse rate. An average pulse rate is between 60 and 90 beats per minute however. The right side of the heart pumps deoxygenated blood to the lungs and the left side of the heart pumps oxygenated blood to the body tissues.

The atria are low pressure pumps because they receive blood and pump it into the ventricles. They have thin walls. The ventricles are high pressure pumps and are therefore thick walled. The heart has a series of valves. They prevent backflow of blood in the system as well as regulate the flow of blood from chamber to

chamber and from chamber to body tissues. The heart also has its own nerve supply.

Heart attack is the number one killer of adults in the United States. It is caused by the blocking of one or more of the coronary arteries. These are the arteries that supply the heart muscle itself with blood and oxygen. The symptoms are prolonged heavy pressure or squeezing pain in the center of the chest often accompanied by vomiting, sweating, and shortness of breath. About half of the heart attack patients die before reaching the hospital.

The Lungs:

The lungs are two coneshaped spongy organs of respiration that are found in the pleural cavity. They are connected with the pharynx through the trachea and larynx. The bottom of the lungs rest on the diaphragm and the top are supported by the ribs and collarbone. The right lung has 3 lobes and the left lung has two lobes. The lungs contain about 300,000,000 alveoli or air sacs. An average respiration rate is 18 breaths per minute. The approximate weight of the lungs in an adult male is 625 gms. for the left lung and 570 gms. for the right.

The left lung is indented to make room for the heart. This is called the cardiac depression. Air travels from the mouth and nose to the pharynx and the trachea. Two main tubes called bronchi extend from the trachea. These tubes lead to smaller ones that go to each of the five lobes. The tubes continue to branch into smaller tubes (bronchioles) until they end in a cluster of air sacs or alveoli.

The alveolus is the point at which the blood and air are separated by only a very thin wall or membrane which allows oxygen and nitrogen to pass into the blood and carbon dioxide and other gases to pass from the blood into the alveoli. The wall can only be seen with the most powerful microscopes available. The lungs have their own nerve supply and blood vessels.

The main purpose of the lungs is to bring air and blood into close contact so that oxygen can be added to the blood and carbon dioxide removed. This happens by two pumping systems moving the gas and the blood together very closely for less than one second.

Lung cancer is a major cause of death in adults and is now the largest killer of adult women in the country. Cancer may invade any part of the lung or its tubes and spreads to all other parts. Lung cancer is often fatal

Lung collapse is a condition that can effect teenagers and young adults with sudden shortness of breath. It can be treated by inserting chest tubes in the thoraxic cavity to lower pressure and allow the lung to reinflate.

Emphysema is an illness that destroys the airsacs of the body and leaves its victim weak and dependent on oxygen therapy. It is most often attributed to cigarette smoking. The lungs do not deteriorate with aging unless they are subjected to pollutants or disease.

The Stomach:

The stomach is a dilated, saclike, stretchable portion of the alimentary canal below the esohphagus and below the diaphragm to the right of the spleen. It is partly under the spleen and partly under the liver. It is composed of a fundus a round part, a body or middle portion, and pyloric portion which is the small end. It has two openings the upper cardiac opening that goes to the esophagus and the lower pyloric opening that goes to the duodenum. The stomach is made up of 4 layers. The outer layer or serous layer covers almost all of the stomach. The middle layer is actually several separate layers of muscle that run in various directions and allow the stomach to contract and expand. You may think of this as the churning we are all familiar with. The third layer is the submucous layer that connects the muscular layer with the mucous lining of the stomach.

This inner layer is made up of specialized cells that secrete gastric juice which is necessary for digestion of food. The stomach is not only the major organ of digestion, it also: 1) regulates when food can pass on to other parts of the gut, 2) acts as a storage compartment, 3) its acid kills a large number of bacteria present in most food, 4) it is important in the acid-base balance of the body, 5) it can excrete some drugs, and 6) it forms a antianemic factor that is necessary for the prevention of pernicious anemia.

Stomach ache is properly termed gastralgia or gastrodynia. It is a pain in the stomach that can be caused by a number of disorders.

Stomach cancer is usually associated with continued pain, often tenderness; vomiting of partially digested food; hematemesis and blood in the stools; presence of a tumor; loss of weight and strength; extreme anemia; and enlarging of lymph glands. The prognosis for patients with stomach cancer is poor. Treatment consists of surgery, radiation and/or chemotherapy, liquid or semi-liquid diet, and rest.

Foreign bodies in the stomach usually pass through the alimentary tract

without disturbance. However, these patients should be under a physician's care. Usually there are no symptoms, but the patient may be very upset. Give nothing by mouth. Do not give salt, laxatives, or enemas as they can make the condition worse.

The Gallbladder:

The gallbladder is a pear-shaped sac on the underside of the right lobe of the liver that holds bile from the liver until it is needed. It is 3 to 4 inches long (7.6 to 10.2 cm.), and 1 inch (2.54 cm.) at its greatest diameter. It can hold between 50 and 75 ml. of concentrated bile that is equivalent to 710 ml. of liver bile. Besides functioning as a storage site for bile, the gallbladder acts to concentrate bile by removing water content.

Gallstones are stones in the gallbladder that may not give the person with them any trouble unless inflammation and distention of the gallbladder take place or unless the stone blocks one of the ducts through which bile normally passes. At that time pain that may spread to the back and right shoulder, usually several hours after eating and when the stomach is empty begins. Flatulence or farting is a common symptom. Jaundice or yellow skin is usually not seen. Treatment of gallstones usually includes pain medicine or analgesics, and surgery.

The Liver:

The liver is the largest organ in the body. It is approximately 21 to 22.5 cm. in its greatest side to side diameter, 15 to 17.5 cm. in its greatest vertical height, and 10 to 12.5 cm. in its front to back depth. The liver weighs 1200 to 1600 gm. (2.5 to 3.3 pounds) It is located on the right side beneath the diaphragm and occupies the right hypochrondrium, epigastrium, and part of the left hypochondrium. It is level with the breastbone or sternum. The underside covers the stomach, duodenum, and right kidney. The liver secretes bile and has many other vital functions.

There are specialized cells in the liver that are very phagocytic. In other words, they remove bacteria and other foreign particles from the blood stream. The liver secretes 800 to 1000 ml. of bile in 24 hours. The amount of bile secreted is greatly increased during digestion.

The liver receives blood from the intestines where the blood has absorbed the final products of digestion and decomposition

products. From this blood the liver removes glucose from which it synthesizes or makes glycogen which it stores. Glucose not stored as glycogen or used to form amino acids is converted to fatty acids, carbon dioxide, and water. The liver breaks down amino acids and converts the byproducts into ammonia and then urea which can be excreted from the body. The liver also makes important proteins such as , prothrombin, and fibrinogen which are necessary for blood to clot.. The liver removes worn out blood cells from circulating blood. The liver also makes heparin which is an anticoagulant, a substance that prolongs the clotting time of blood.

The liver also stores vitamin B12, the antipernicious anemia factor, and it stores the fat soluable vitamins A,D,E, and K. It plays a part in regulating how much blood is circulating at one time and is a main source of body heat. It is important in lipid or fat metabolism. Cholesterol is made mainly in the liver as well.

Abcesses of the liver- caused by infectious organisms such as staphylococcus, streptococcus, and pneumococcus can cause an elevated body temperature in the evening that is low in the morning; sweats and chills; liver enlargement, painful, tender, may be bulging in the abdomen. Pus may be removed by suction. Multiple abcesses are usually fatal.

Cancer of the liver- heredity and sex affect your chances of getting this disease. Males having a higher risk than females. The liver is the most usual site for tumors to spread from other parts of the body through the bloodstream. Its symptoms include severe pain and tenderness; loss of flesh and strength; jaundice; liver enlargement; surface nodules. The prognosis is fatal with life expectancy from a few months to a year.

Cirrhosis of the liver- generalized disease in the liver that causes a change in shape and size and nodules to be present. There is also a change in liver function. The disease can lead to complete liver failure. Symptoms include abdominal swelling, jaundice, weakness, weight loss, loss of appetite, nausea, and mild continous fever.

In the U.S. the most frequent cause of cirrhosis is alchoholism. About 20% of theose who drink alchohol heavily for a 5 to 10 year period develop cirrhosis. Cirrhosis may also occur in individuals who do not drink.

The Pancreas:

The pancreas is a gland 6 to 8 inches in length. It lies transversely across the posterior or back wall of the abdomen. Its right end, called the head, lies in contact with the duodenum.

Its left end, called the tail, lies close to the spleen. It secretes a clear colorless fluid that digests proteins, carbohydrates, and fats. The fluid acts on food that has already been acted upon by gastric juice and saliva. The secretion passes into the duodenum through the pancreatic duct or ducts. The pancreas also secretes an important internal hormone, insulin from the islets of the pancreas. Insulin is necessary to transport glucose molecules through the individual cell walls so that it may be used for energy.

Diabetes is a chronic disorder that is inherited. Diabetes is caused by a disturbance in normal insulin production which causes a disorder in charbohydrate metabolism. The signs of diabetes include high blood sugar (hyperglycemia), sugar in the urine or (glycosuria), and alterations in protein and fat metabolism which cause voiding large amounts of urine (polyuria), weight loss, (polydipsia) or excessive thirst, (ketosis) or high levels of ketone bodies which are waste products of fat metabolism, (acidosis) or high acid in the blood, and coma. High ketones in the blood cause diabetic acidosis. The symptoms of diabetic acidosis are weakness, headache, thirst, air hunger, and coma.

A number of disabling conditions can result from poorly controlled diabetes. These include diabetic gangrene and diabetic retinopathy. Diabetic gangrene is the dying of a part of the body due to inadequate circulation of blood. Usually the feet and legs are affected and the problem begins with an injury. Diabetic retinopathy is caused by inadequate blood flow to the retina which can lead to blindness. Treatment for diabetes consists of a very carefully controlled relationship between diet, excercise, and insulin injections or oral hypoglycemics (medicine that can be taken by mouth to stimulate production of insulin when the pancreas has not completely stopped producing it).

Pancreatic cancer is a very dangerous and often undetected cancer with a deadly outcome.

Pancreatitis is the inflammation of the pancreas often associated with alchoholism. The patient often experiences severe and intense pain in the epigastric region of sudden onset. Belching of gas, vomiting,

sometimes hiccough, collapse. Rigidity and tenderness over the umbilicus is often present. Constipation, slow pulse, and possible jaundice are other signs of pancratitis. There are several forms of pancratitis.

The Urinary System

The Kidneys:

The kidneys are two organs purplish-brown in color, located at the back of the abdominal cavity, one on each side of the spinal column. Their function is to excrete urine and to help regulate the water, electrolyte, and acid-base content of the blood.

Each kidney weighs approximatly 113 to 170 gm. (4 to 6 ounces). They are about 11.4 cm. (4 1/2 inches) long, 3 inches broad, and 2.5 cm. (1 inch) thick.

Each kidney is surrounded by fatty tissue and a sheath of fibrous tissue, which helps hold the kidney in place. The ureter enters the kidney through the concave portion known as the hilum.

The inside of the kidney is filled with specialized structures as well as connective tissue, blood vessels, nerves, and lymphatics. The renal tubule or nephron is known as the structural unit of the kidney much as the cell is the structural unit of each tissue. Each nephron is made up of many smaller structures.

The kidneys act to maintain homeostasis of the body by removing urine which consists of 95% water and 5% solids. Urine is formed by filtering and reabsorbing substances from the blood. Blood cells and proteins are two substances that should not pass through the filtering structures of the nephron and should therefore be reabsorbed into the body.

The formation of urine is a continuous process that is affected by the blood pressure within the kidney's specialized structures as well as by daily fluid intake. Protein in the blood is important because it causes the pressure within the bloodstream to hold water and valuable minerals in circulation through osmotic pressure.

The amount of urine excreted daily varies from 1000 to 2000 ml. averaging 1500 ml. or about 1 and 1/2 quarts. The amount of urine varies with water intake, type of diet, activity, environmental and body temperature, age, blood pressure, and many other factors. Disease can often affect urine production.

Symptoms of kidney problems include low back pain, fever, presence of blood or pus in the urine, burning, scanty, or frequent urination,

tenderness, swelling, or enlargement of the kidneys.

The Bladder:

The bladder is the saclike organ in which urine is stored after being produced in the kidneys and transported to the bladder through the ureters. The bladder has several layers and is divided into three sections. The neck, or lower portion of the bladder is continuous with the urethra which is the tube that urine is excreted from. The middle section is the apex, and the top section between the two openings to the ureters is called the trigone. The bladder is composed of muscle and fibrous tissue and has a mucous inner layer. It is supplied by many blood vessels and is held in place by ligaments.

The bladder is located in the anterior portion of the pelvic cavity. In the female, it lies in front of the anterior wall of the vagina and the uterus, and in the male it lies in front of the rectum. It has a storage capacity of 1/2 liter (500 ml.) or more in health. In disease it can be greatly distended or swollen.

An average of 40 to 50 oz. (1.2 to 1.5 liters) of urine are secreted within a 24 hour period. This amount varies according how much a person drinks, their activity level, temperature, sweating, bowel movements, and any disease.

A frequent cause of bladder distention in the elderly male is called benign prostatic hypertrophy. This is often a result of cancer of the prostate gland which swells and blocks off the urethra. Surgical removal of the prostate or a T.U.R. (transurethral resection) may correct this problem if the cancer has not spread. Bladder distention can be caused by other diseases including urinary tract infections and medication allergies or overdose.

The Small Intestine

a- The Duodenum

The duodenum is the first part of the small intestine, beginning at the pylorus. It is 8 to 10 incles long and is the most fixed part of the small intestine. It contains openings from the pancreas and gallbladder throughwhich bile and pancreatic juice are secreted. The duodenum extends to the jejumum. The duodenum is a very important section of the

alimentary canal. It is where acid from the stomach, bile from the liver and gallbladder, pancratic juice entering by way of two ducts, and intestinal juice mix.

Duodenal ulcer is a broken mucous membrane in the duodenum that often causes pain and indegestion. It is slow to heal to the constant presence of irritating fluids, enzymes, and food. Sometimes a sore which bleeds is present. The biggest danger is that the ulcer may perforate and cause infection in the abdominal cavity.

b- The Jejunum:

The jejunum is the second portion of the small intestine extending from the duodenum to the ileum. It is about 8 ft. (2.4 meters) in length. It makes up about two-fifths of the small intestine.

Inflammation of the jejunum may be present in bacterial infections of the intestinal tract or in regional enteritis.

c- The Ileum

The ileum is the lower three-fifths of the small intestines from the jejunum to the iliocecal valve. It varies in the adult male from 31 ft. 6 in. (9.6meters) to 15 ft. 6 in. (4.72 meters).

An ileus is a twisting blockage of the small intestine that has symptoms of sudden pain, continous constipation, vomiting fecal material, swollen abdomen, and collapse.

The Large Intestine

A- The Cecum:

The cecum is a blind pouch or cul-de-sac which forms the first portion of the large intestine, located below the entrance of the ileum. It averages about 6 cm. in length and 7.5 cm. in width, at its lower end is the appendix.

B- The Colon:

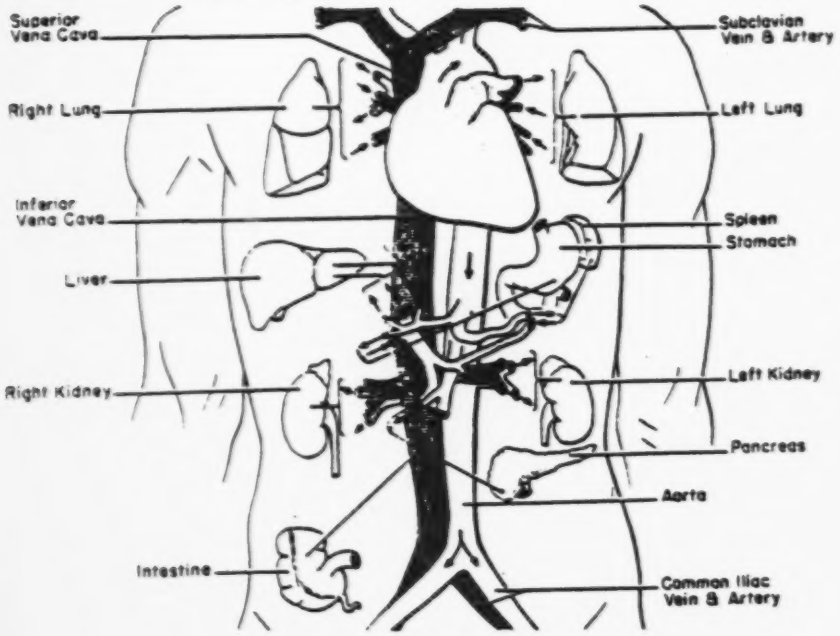
The large intestine from the end of the ileum and beginning with the cecum to the anus is about 59 inches (1.5 meters) long. It is divided into

the ascending, transverse, descending, and the sigmoid colon.

The large intestine has no digestive enzymes but a fluid does aid in the completion of digestion that is begun by the small intestines. The large intestine absorbs water and also harbors helpful bacteria that finish the digestive process.

Irritable colon is the most frequently seen gastrointestinal disease. It affects both the small and large intestine and is accompanied by pain, constipation, or constipation alternating with diarrhea. The symptoms may be chronic or recurring at intervals usually triggered by stress. The disease lessens as stress is relieved.

Study the following illustrations showing major organs and their location in the body:



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Worksheet #2 for Pin the Part on the Person:

Answer the following questions regarding the function of individual organs of the body.

1- Weighing between 113 and 170 gm. each, this organ's chief unit is known as the nephron.

a- Gallbladder
b- Duodenum
c- Pancreas
d- none of the above

2- One of the largest adult organs, this organ consists of 3 parts and controls such functions as respiration and circulation.

a- Liver
b- Brain
c- Ileum
d- none of the above

3- This organ is composed of four chambers and is essentially a large muscle.

a- Lungs
b- Kidneys
c- Ostomy
d- heart

4- This organ is normally pink and spongy and has the alveoli as its basic structural unit.

a- Lungs
b- Liver
c- Jejunum
d- none of the above

5- Match the following organ with the statment that describes it:

a- Pancreas	1- largest organ
b- Duodenum	2- makes insulin
c- Cecum	3- "blind pouch"
d- Liver	4- forms antianemic factor
e- Stomach	5- begins at the pylorus
	6- stores vitamins

Label the parts of the brain:

Draw a line from the name of the organ to its proper location in the body□

1- right lung

2- liver

3- pancreas

4- heart

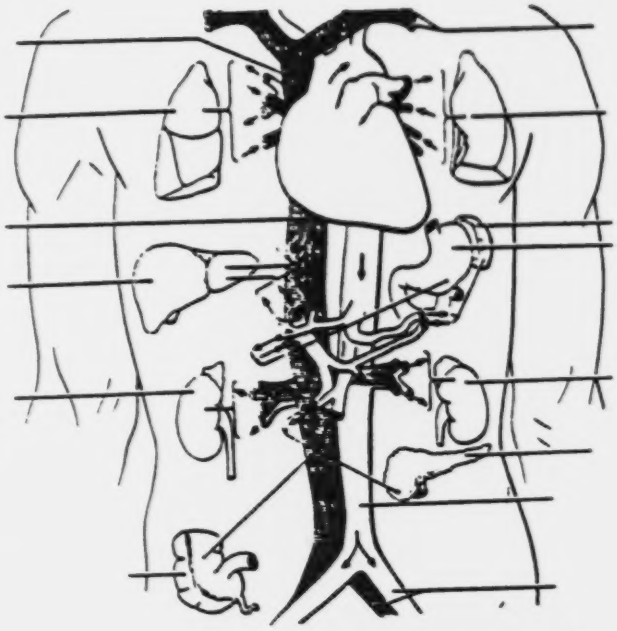
5- right kidney

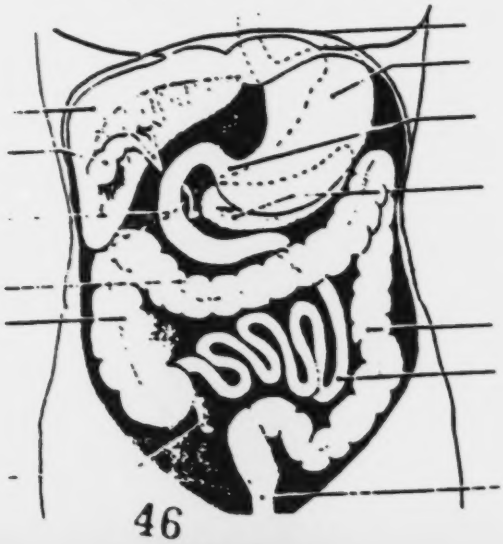
6- ileum

7- gallbladder

8- colon

Label each organ on this side





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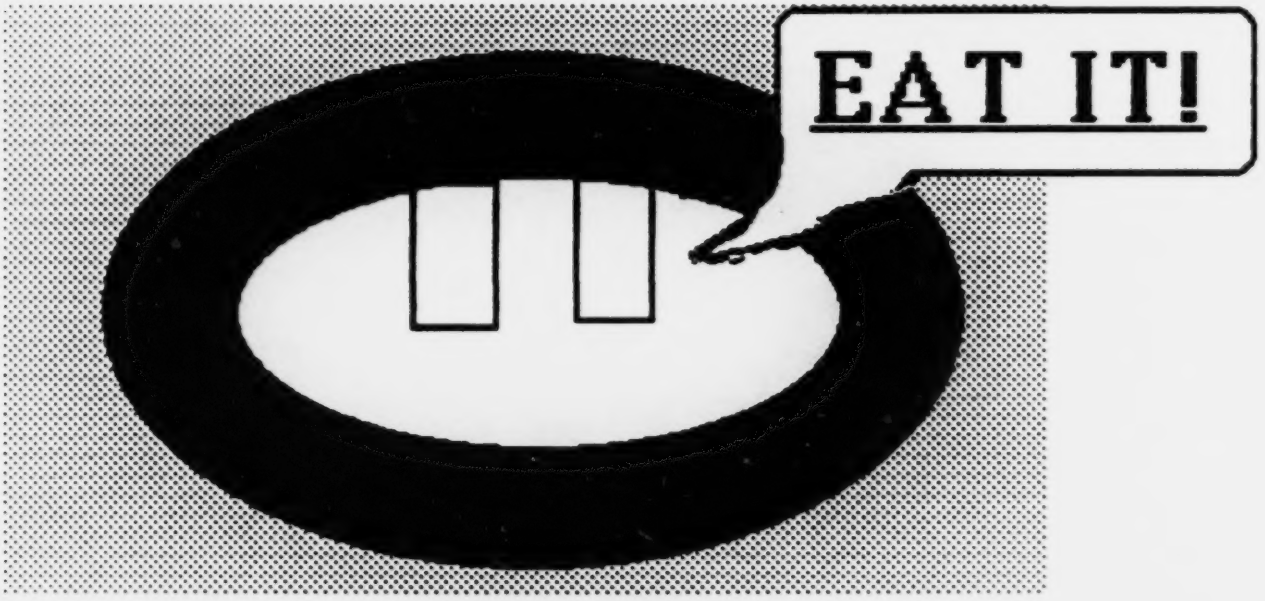

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Introduction to "Eat It"

Teaching Unit: **Nutrition and Diet Therapy**

Training Activities:

(1) Application of nutritional principles to career situations.
(2) Planning therapeutic diets
(3) Solving stated problems

Unit Objectives:

Following completion of module and group excercise, the learner should be able to:

(1) Describe the major food groups in terms of classification, functions, and sources.
(2) State the importance of vitamins, minerals and water in the diet.
(3) Name the major adverse effects of each dietary deficiency including conditions and diseases.
(4) Work in a group to apply dietary principles to creating a therapeutic nurtritional plan for identified clients.

Related Competencies: **[Science Related Competencies]** -

(1) The learner will have an understanding of the importance of caring for the body through proper nutrition, health, and sanitary practices.

(2) Identify from a list of foods a menu which includes the four basic food groups.

(3) Define calorie.

(4) Describe how energy can be obtained from matter such as the burning of wood and digestion of food.

[Health Occupations]-

7931 Unit III

(1) Classify dietary foods according to nutrients.

(2) Describe nutritive deficiencies.

7932 Unit IV

(3) Discuss basic therapeutic diets as a means of treating major diseases/disorders

Introduction

Suppose we really are what we eat. That would mean that I am more a Hamburger and Diet Drink right now than Chicken Sandwich and Milkshake. Of course that isn't really what I look like or feel like or anything. Why then do people say that you are what you eat. If I take a closer look at that Hamburger I can begin to see that it is several kinds of food all clumped together. First, it is 4 ounces of ground beef in the middle. Second, it is a couple of ounces of bread on the top and bottom with a few sesame seeds sprinkled on for good measure. Third, it is two medium slices of tomato and a piece of lettuce. Fourth, we have a squirt of mayonaise and ketchup. Fifth, is the chopped onion and pickles. Sixth, well you get the idea. The list could go on to describe a truly huge burger. What do all of these ingredients have in common? Give up? All of the ingredients of this burger are made up of Carbohydrates, Fats, Proteins, Vitamins, Minerals, and water. In fact, everything we eat is a combination of these same 6 basic units of food. Each of these units is responsible for some bodily function which will suffer if eaten in too large or too small amounts. Also, different foods give us different amounts of these basic units. In order to better understand this idea, lets take a closer look at each of these units of food in more detail.

Proteins

Proteins are important normal parts of every living cell. They are essential components of both the nucleus and cell protoplasm. Proteins are very large molecules which are made up of amino acids (basic building blocks of life).

Proteins have different properties depending on the kinds of and numbers of amino acids that make them up. Proteins must be broken down into amino acids by the digestive system before they can be carried by the blood to individual cells. Amino acids that can only be gotten from the food that we eat are called essential, while those amino acids that the body makes as the need arises are called nonessential amino acids. Amino acids are responsible for growth, maintenance, and repair of the body.

Proteins are classified according to their ability to supply all of the amino acids required for the formation of body tissues, enzymes, and hormones. In addition to the completeness of the protein, digestibility is even more important. As mentioned earlier, a protein must be digested into amino acids before the body can use it. The way food is prepared effects how well it can be digested. Overheating, especially without using water (baking, frying), reduces the nutritional value of the protein by destroying essential amino acids. Eggs are at the top of the list of proteins that are high in biologic value. Milk and milk products rank a close second. Not eating enough proteins and calories, or taking in proteins which do not provide an adequate supply of all the essential amino acids is the major malnutrition problem in the world today.

Carbohydrates

Carbohydrates are compounds that contain carbon, hydrogen, and oxygen. Hydrogen and oxygen are found in carbohydrates in the same proportions that are found in water. With only a few exceptions, carbohydrates all come from plants.

Carbohydrates are synthesized in nature by green plants from carbon dioxide in the atmosphere and water when sunlight is present. This process called photosynthesis is vital to life since mose animals eat carbohydrates found in plants as their main diet.

Carbohydrates are classifed according to their molecular structure. Three main types of carbohydrates are: 1) Monosaccharides- simple sugars

which cannot be broken down into smaller units by digestion; 2) Disaccharides- more complex sugars, formed by two monosaccharides that can be split into these two component units during digestion; and 3) Polysaccharides- larger, complex molecules which are made up of many monosaccharides that can be digested into simple monosaccharide units.

An example of a Polysaccharide is starch. 3 monosaccharides that are important to human nutrition are glucose, fructose, and galactose. Sucrose (cane or beet sugar) and lactose (milk sugar) are important disaccharides, as well as maltose, which is formed during the digestion of starches. Starch, cellulose, and glycogen (animal starch) are examples of polysaccharides which are important in human nutrition.

When starch is digested, it is broken down into units of maltose which are then broken down into glucose which can be carried to body cells by the blood for energy. Glycogen is the form in which the animal cell stores carbohydrates. Glycogen can also be broken down into glucose when digested.

Cellulose is a polysaccharide which serves as the structural component of plant tissues. The human digestive tract does not secrete an enzyme which is capable of digesting cellulose. When eaten with fruits, vegetables, or as the residue of whole grains, cellulose remains unchanged and provides the roughage and bulk which is essential for proper functioning of the lower intestinal tract and the formation of feces.

Cereals, vegetables, and fruits are the major natural sources of carbohydrates. Milk and its derivatives contribute lactose to the diet, the only major carbohydrate of animal origin in our food supply.

Carbohydrates are the preferred fuel of the body. This is because it takes less energy for the body to turn carbohydrates into energy than either proteins or fats. The body has a limited capacity for storing carbohydrates in the body as glycogen, however, its ability to store fat is not so restricted. Therefore, when the body takes in more carbohydrates than it can use they are converted to fat and stored in the adipose tissue. This holds true for all foods that are taken in in excess of the body's caloric needs. When carbohydrates are no longer available for energy production, the body begins to break down tissue fat and protein for energy. A certain amount of carbohydrates should always be present in the diet to prevent the body from breaking down protein in the body. This is known as the "protein sparing" role of carbohydrates.

Carbohydrates usually make up the bulk of man's energy supply. Carbohydrate intake varies with economic status and agricultural practices within different countries. Since vegetable products are cheaper than meat products, many poorer countries rely heavily on carbohydrates as their main source of nourishment. A diet that assures an adequate intake of vitamins and minerals, fat for essential fatty acids and fat soluble vitamins, and protein sufficient to fulfill the needs for growth, defense mechanisms, tissue repair and maintenance is what is important.

Fats

Fat is a necessary component of living tissues and essential in human nutrition. Fat is the main reserve fuel of the body. It is the most concentrated energy source which the diet can provide. Weight for weight, it furnishes more than twice as much energy as proteins or carbohydrates, and combines a high caloric value with very little bulk. Fat is the sole source of energy which the body can store in quantity. Stored fat is readily mobilized when needed as fuel. Fats, or lipids, make up a group of compounds which are related to one another by the fact that they are insoluble in water and soluble in fat solvents. They contain one or more fatty acids in their molecule or are combined with a fatty acid. Fats can be classified as saturated and unsaturated based on the way the molecules are bonded together. If a mixture or fat is solid at room temperature it is called a fat and is usually made up of saturated fatty acids. If it is liquid it is considered to be an oil and usually contains unsaturated fatty acids.

The chief sources of food fat are vegetable oils, butter, margarine, lard, milk, cheese eggs, meats, fish, and nuts. Cholesterol is widely distributed in the body, especially in nervous tissue, blood, and bile. Cholesterol is necessary for the formation of adrenal and sex hormones. In the skin it serves as a precursor of vitamin D. When the skin is exposed to sunlight or ultraviolet irradiation, cholesterol and closely related compounds are converted to active vitamin D.

Cholesterol is necessary for absorption of fatty acids from the intestine and the transportation of those fatty acids in the blood Cholesterol is found only in foods of animal origin. The body can also make cholesterol in the liver according to how much is taken in in the diet. Much of the metabolism of the fatty acids

takes place in the liver as well. Fat deposits are found under the skin, in the peritoneal cavity, around the kidneys and ovaries and interspersed with the muscles. The kinds of fatty acids found in this stored fat varies. There is no limit known to the capacity of the body to form and store fat when caloric intake exceeds expenditure.

Fat slows the emptying of the stomach and decreases the motility of the stomach which delays the onset of the sensation of hunger. That is why meals that are high in fat are said to "stick to your ribs" longer. Fat exerts a sparing action on protein and also is necessary for essential fatty acids and fat soluble vitamins.

As with carbohydrates, economic factors seem to govern the level of fat in many food patterns. However, fat is seen in higher levels in families that have money for the purchase of more fat-containing foods like meats, eggs, and dairy products. Study the following chart to learn more about carbohydrates, fats, and proteins.

	CLASSIFICATIONS	FUNCTIONS	SOURCES	DEFICIENCIES/ CONDITIONS
Carbohydrates 1 GM = 4 calories	1. Monosaccharides 2. Disaccharides 3. Polysaccharides	1. provide heat and energy 2. essential for fat metabolism 3. protein-sparing by providing energy and sparing protein for other use.	Main source plants; foods rich in carbohydrates are bread, flour, cereals, macaroni products, sweet desserts, potatoes, corn peas, beans, bananas, apples pears.	1. Loss of weight Excess CHO 1. increase incidence of dental caries. 2. obesity 3. irritation of the gastrointestinal mucosa.
Fats 1 GM - 9 calories	1. Visible 2. Invisible or 1. saturated 2. unsaturated	1. furnish concentrated form of energy. 2. function and structure of body tissue. 3. lubricate intestinal tract.	Butter, margarine, cooking oils, mayonnaise, cream, rich pastries, bacon, fatty meats, egg yolk.	Excess Fat 1. Atherosclerosis 2. Obesity 3. Slows digestion and absorption of food products. 4. Interferes with absorption of calcium. 5. Cause ketosis
Proteins 1 GM = 4 calories	1. complete 2. incomplete	1. Makes new cells and rebuilds tissue 2. provides energy 3. maintain water balance 4. essential for normal growth & devel	complete protein: meat fish, poultry, eggs, milk, and cheese. incomplete protein: gelatin, cereal, corn, peas, beans.	Loss of appetite, strength and weight. Wounds heal slowly, nutritional edema, mental retardation, lack of proper growth. Marasmus, Kwashiorkor.

Vitamins

Vitamins are a group of organic compounds that are necessary in small quantities for the body to turn food into energy. They cannot be made by the body and must be taken in when we eat. No one food contains all of the vitamins, in sufficient quantities, to satisfy the human requirements under normal conditions of food intake. Unlike macronutrients like proteins, carbohydrates, fat, and water, vitamins are needed in relatively small quantities. This is because the function of most vitamins is catalytic (increases the speed of a chemical reaction). Vitamins are usually divided into two groups on the basis of their solubility.

Fat soluble vitamins A, D, E, and K are found in foods in association with lipids. These fat soluble vitamins are absorbed along with dietary fats. They tend to be stored in the body in moderate amounts. Man is not absolutely dependent on their day-to-day supply in the diet because of this fact.

Water soluble vitamins, on the other hand, can be absorbed by themselves and are excreted with urine. They are not stored in the body in large quantities and a constant dietary supply of these vitamins is needed to avoid a shortage in the body with resulting adverse affects on the normal fuctioning of the body.

Vitamins can be synthesized or made by the intestinal flora. They are sensitive to light and heat so they should be kept in a cool place in dark bottles. Please study the following table to learn more about vitamins.

Vitamin	Functions	Sources	Deficiencies/ Conditions
A	Normal function of mucous membranes	liver, egg yolk, butterfat, deep yellow veges.,	changes in secretion
	normal vision	dark green leafy veges., tomatoes,	vision impaired
	effects growth of bones and teeth	cheese, liver, whole milk	defective bones and teeth
D	increases absorption of calcium and phosphorus,	liver, egg yolk, fish-oils, fortified milk	loss of calcium and phosphorus (osteomalacia)
E	antioxidant	seed oil, soybean oil, peanut oil, margarine, eggs	unknown

K	bleeding tendencies	essential for blood clotting	green leafy veges., pork liver
B1	Thiamine essential for release of energy from carbohydrates, vital to proper nerve conduction	yeast, wheat germ lean meats, pork, peas, whole grain enriched products	Beriberi, nerve inflammation
B2	Riboflavin essential for cellular oxidation and the storage of energy.	organ meats, meat, milk, eggs, green veges., fowl, yeast	skin/lip lesions malfunctioning of eyes, inflammation of the cornea, lack of energy
Niacin	Antipellagra vitamin	meat, fowl, fish, legumes, whole grains	Pellagra
B6	Pyridoxin necessary for metabolism of amino acids and fatty acids	muscle meats, liver, yeast, molasses, whole grain cereals	skin lesions, anemia,
Folic Acid	Necessary for the synthesis of amino acids and DNA	liver, yeast, green leafy veges.,	Macrocytic anemia
B12	called "extrinsic factor" makes food	liver, kidney, milk, fish, muscle	Pernicious anemia
C	prevents scurvy and promotes wound healing	citrus fruits, tomatoes, melons, berries, raw veges.	Scurvy, poor wound healing

The Role of Minerals in the Body

Minerals are inorganic substances which are supplied in a balanced diet. Minerals play an important part in maintaining the water balance within the body.

The weight of the body consists of approximately 60 to 70% water. All cells are bathed in a watery solution which brings them nourishment and removes waste products of the metabolic process. Electrolytes are suspended in this aqueous or watery solution. They are particles which result from the breakdown of larger compounds. These particles are found dissolved in body fluids as ions which carry electrical charges. Those with positive charges are called cations. Those with negative charges are called anions. The normal fluid state in which positive and negative ions are in balance is called homeostasis.

Cations:

Among the chief cations, the positively charged metallic ions are sodium, potassium, calcium and magnesium.

Sodium is responsible for intracellular and extracellular pressures. Loss of great amounts of sodium may lead to shock. Great excesses may be a factor in causing edema in congestive heart failure and some types of kidney diseases. Good sources are salt, meat, fish, fowl, cereals, fruit beverages, tea, and cola.

Potassium deficiency may affect skeletal as well as cardiac muscles. Good sources are meat, fish, fowl, cereals, fruit beverages, tea, and cola.

Calcium ions are important in normal heart rhythm, blood clotting, muscle contraction, and nerve irritability. Good sources are milk, cottage cheese, ice cream, shrimp, and broccoli.

Magnesium ions are important in maintaining muscle and nerve irritability. Best sources are milk and cereals.

Anions:

Among the chief anions, the negatively charged non-metallic ions are chlorides, iodides, phosphates, and bromides.

Chlorides are responsible for osmotic pressure in cells. Osmotic pressure is the pressure caused when 2 different strengths of the same dissolved substance are separated by a membrane that allows only the solvent to pass through it. Good sources are salt, milk, and eggnog.

Iodides are responsible for maintaining our metabolism. They are stored in the thyroid gland as protein compounds. Good sources are seafood and iodized salt.

Phosphates are important in our buffering system. They metabolize fats, transport fatty acids, metabolize carbohydrates, and help build bones and teeth. Good sources are milk, egg yolk, and whole grains.

Bromides have been used in the past as sedatives and hypnotics but are less frequently used now.

CHIEF CATIONS AND ANIONS

The extracellular fluid refers to fluid which is outside the cells. The intracellular fluid refers to fluid inside the cell

- Sodium is the chief cation in the extracellular fluid.
- Chloride is the chief anion in the extracellular fluid.
- Potassium is the chief cation in the intracellular fluid.
- Phosphate is the chief anion in the intracellular fluid.

Worksheet for Vitamins

Match the 2 columns by placing the letter of the word or phrase from column II beside the item in column I that it **most** correctly describes:

Column I	Column II
___ 1. Vitamin C	a. Aids in coagulation of blood
___ 2. Vitamin B2	b. Antisterility vitamin
___ 3. Vitamin B6	c. Prevents night blindness and promotes health of mucous membranes
___ 4. Vitamin E	d. Skin lesions and hypochromic anemia
___ 5. Vitamin B12	e. Minimum daily requirement
___ 6. Vitamin B1	f. Prevents pellagra
___ 7. Niacin	g. Prevents scurvey
___ 8. Vitamin A	h. Prevents beriberi
___ 9. M.D.R.	i. Given intramuscularly for treatment of pernicious anemia
___10. Vitamin K	j. Skin and lip lesions. Malfunctioning of eyes and inflammation of cornea

Circle the MOST Correct Answer to the Following:

1- Which of the following is not a water soluble vitamin?
- a- C
- b- A
- c- Niacin
- d- None of the Above

2- Which of the following vitamins is fat soluble?
- a- E
- b- B6
- c- A
- d- a and c only

3- Water soluble vitamins are:
- a- stored in relatively large quantities in the body
- b- excreted in urine
- c- destroyed by sunlight and heat
- d- b and c only
- e- all of the above

4- Which of the following answers best describes the major function(s) of water soluble vitamins in the body?
- a- help make red blood cells
- b- necessary for release of energy from foods
- c- prevent certain anemias
- d- a and b only
- e- all of the above

5- Fat soluble vitmins are stored in the:
- a- neck
- b- liver
- c- pancreas
- d- adipose
- e- b and d only
- f- none of the above

Worksheet for Minerals-

Match the two columns by placing the letter of the word or phrase from column II beside the item in column I that it most correctly describes:

Column I	Column II
___ 1. electrolyte	a. factors in osmotic pressure of cells
___ 2. anion	b. found only in beef products
___ 3. catalyst	c. negatively charged non-metallic ion
___ 4. calcium	d. positively charges metallic ion
___ 5. sodium	e. a normal fluid state in which postive and negative ions are in balance
___ 6. chlorides	f. organic substances necessary for normal growth
___ 7. homeostasis	g. factor in intracellular and extracellular pressures
___ 8. vitamins	h. factor in heart rhythm, blood clotting, muscle contraction and nerve irritability.
___ 9. nonorganic substances	i. particle resulting from disintegration of compounds
___10. cation	j. substances found in animal and vegetable products
	k. found only in iodized salt
	l. a substance which aids or changes the speed of a chemical reaction

Eat It Group Excercise

You and your friends own and manage an exclusive health resort and weight management center on the coast of North Carolina. Your clientele consist mainly of older adults who are recuperating from illness and many of them have been hospitalized prior to coming to the resort. Your main mission is to promote the clients maximum level of health and wellness. This includes their physical, mental, emotional, and social well being. You will use a variety of therapeutic techniques to accomplish this including excercise, diet, and relaxation techniques for stress management. One of the major considerations for managing the care of these clients is a therapeutic nutritional program. You and your co-workers must prepare the meals for the clients. Using whatever resources that you have available, prepare a menu for the following list of clients that includes breakfast, lunch, dinner, and any snacks for one day at the resort. In order to be economically profitable, the meals must be suitable for all of the guests. They will be judged on nutritional content, originality, cost for preparation (approximate according to current market prices and seasonal considerations), age appropriateness, overall appeal, and time and expertise needed for preparation.

You have two hours to complete this project. A group spokesperson will present the final menu to the class along with a brief explanation for all dietary items. Class members will score each group's diet on a scale from 1 to 4 for the items listed above (1=excellent, 2= good, 3=fair, 4=poor). A dietician and the classroom teacher will be available for questions during the excercise. They will not provide you with any assistance that can be found in the materials, however. The classroom teacher and dietician will also rate the groups using the same scale. The winning menu will be the subject of a bulletin board that will be prepared by the winning group.

You have 10 guests at the guesthouse this week. Guests pay $1,000.00 per week for accommodations. You have determined that no more that $20.00 per day per person can be allotted for 3 meals plus any snacks. Five of this weeks guests have no medical problems. The other five guests are described on the page that follows.

How to Proceed:

1- Break into groups 3-5 persons.
2- Read the descriptions of those clients for whom dietary restrictions may be necessary.
3- Plan a menu for one full day including snacks (if appropriate).
4- Be ready to explain the dietary value of the menu to the class.
5- Give normal weight ranges for the guests described.

Eat It Materials List

The following materials will be available to you in planning you menu:

1- Newspapers with local grocery store ads.
2- Nutrition textbooks.
3- Recipe books.
4- Class notes.
5- Eat It modules.

The following is a guest list and description of clients that you will be preparing meals for this week:

1- 66 year old female. 5'6", 129 pounds. Owns Weight Watchers in Charlotte, N.C. Recently hospitalized for evaluation of adult onset diabetes. Currently maintained on a NO ADDED SUGAR diet and oral hypoglycemics.

2- Hypertensive 68 year old recently retired business executive from Research Triangle Park in N.C. At resort to lose weight and learn relaxation techniques. 5'11", 200 pounds.

3- 64 year old schoolteacher recently released from hospital for treatment of depression. Suffers from chronic constipation. 5'3", 133 pounds.

4- 72 year old former professor. Recently widowed. At resort to meet people and try to regain his appetite which has been dwindling ever since his wife died 3 months ago. 6' 1", 144 pounds.

5- 59 year old morbidly obese male has come to resort for weight reduction and counseling. He is to have a liquid diet for two meals per day which he has brought with him. He may eat breakfast as his only solid meal of the day. 5'9", 322 pounds.

(Your other 5 guests range in age from 62 to 77 and are generally in good health.)

Good Luck!

FOOD FOR GOOD HEALTH

A good nutritionally-balanced diet is the basis for a healthy life. All sound diets offer a variety of foods that provide your body with the protein, carbohydrates, fats, minerals, vitamins, and water needed for energy, growth, tissue repair and maintenance. Fiber is believed to be of importance to proper body function, also. To stay healthy and feel great, build your daily diet around recommended selections from the four basic food groups:

BREAD AND CEREAL ... whole grain or enriched, supply fiber, B vitamins, iron, calcium, other minerals, protein, and necessary carbohydrates. Have 4 servings a day. (One slice of bread, 2 graham crackers, 3/4 cup of ready-to-eat cereal, or 1/2 cup of cooked cereal, rice, or pasta is one serving.)

FRUIT AND VEGETABLE ... provide necessary carbohydrates, fiber, vitamins, and minerals, especially vitamins A and C. Have 4 servings a day. Citrus fruits, cabbage, melon or berries provide vitamin C, carbohydrates and fiber. For vitamin A, choose dark green and deep yellow vegetables. (1/2 cup of vegetables or 1 medium piece of fruit equals one serving.)

DAIRY ... this group includes cheese, yogurt, ice cream, cottage cheese, providing calcium, riboflavin -- an important B vitamin -- and protein. Eat 2 servings a day for healthy bones, teeth, and muscles. (One cup milk -- whole or skim -- or 1 oz. cheese equals one serving.)

MEAT, FISH, POULTRY, AND OTHER PROTEIN SOURCES ... supply protein, iron, and vitamins. Aim for two servings per day. (Two ounces lean meat, poultry or fish, two eggs, one cup of cooked legumes or 4 tablespoons of peanut butter all equal one serving.) Remember, when using cheese as a protein source ... include servings from the dairy group, also, to provide the dairy nutrients. One group does not replace the other: they all work together to help your body work.

The U.S. Department of Agriculture and Department of Health and Human Services have developed these Dietary Guidelines for Americans to help you achieve healthy eating habits. They may also help reduce the risks of obesity, hypertension, diabetes, heart disease, diseases of the colon and malnutrition. Suggested guidelines are as follows:

1. EAT A VARIETY OF FOODS
   Select servings from each of the four basic food groups at each meal to provide the nutrients your body needs to stay healthy.

2. MAINTAIN IDEAL WEIGHT
   Being overweight can lead to health problems. Maintaining ideal weight not only looks better, it feels better.

3. AVOID TOO MUCH FAT, SATURATED FAT AND CHOLESTEROL
   A diet high in fat may be associated with heart disease. It is recommended that you limit your fat intake to 30-35% of your total daily food intake, with up to 10% of your fat calories coming from polyunsaturated fats (like vegetable oils.)

4. EAT FOODS WITH ADEQUATE STARCH AND FIBER
   Complex carbohydrates, found in whole grains, vegetables and fruits, are important sources for vitamins and minerals. High in fiber, they aid in the prevention of intestinal and other problems and in lowering blood sugar and cholesterol levels.

5. AVOID TOO MUCH SUGAR
Foods that are high in sugar are often high in calories without providing essential nutrients. It's best to limit your daily intake of these foods. Replace those refined sugars with more complex carbohydrates such as fruits, vegetables, and grains like whole grain bread or pasta.

6. AVOID TOO MUCH SODIUM
Most Americans consume much more sodium than they need. A high intake of sodium has been associated with the development of high blood pressure. Limit table salt, seasoned salt since sodium <u>is</u> part of salt. Try cooking with fresh herbs and spices.

7. IF YOU DRINK, DO SO IN MODERATION
Alcohol is high in calories, low in nutrient value. Alcohol is also a health risk to those who are pregnant or taking certain medications. If you have a drink, make sure you have eaten or are eating a healthful snack at the same time.

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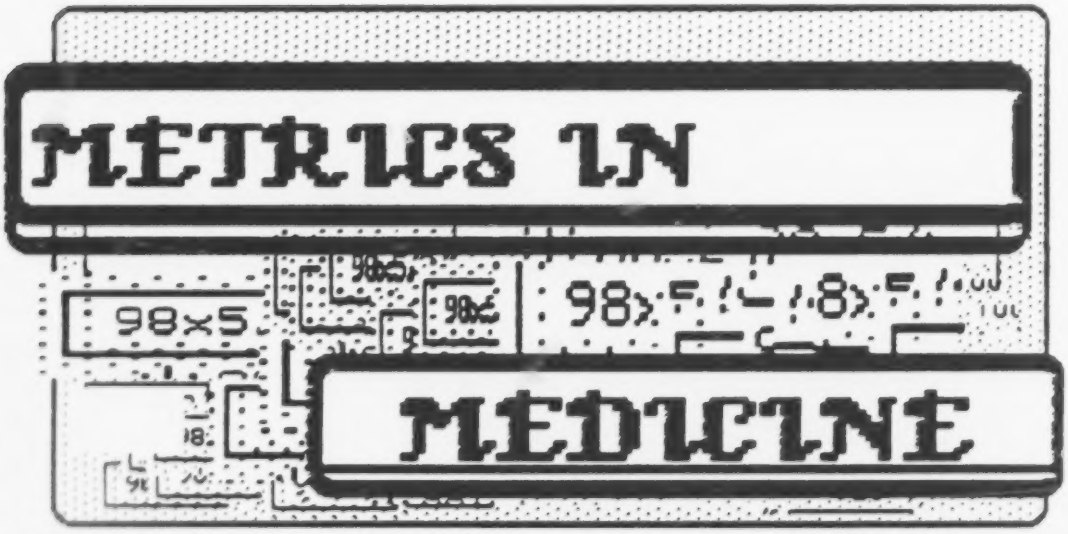

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METRICS IN MEDICINE

Teaching Unit: THE METRIC SYSTEM

Training Activities:
(1) Conversions between the English, Metric, and Apothecaries systems.
(2) Solving stated problems.

Unit Objectives:
Following completion of this module and group discussion, the learner should be able to:
(1) Solve basic problems of conversions between the Metric, English, and Apothecaries systems.
(2) State the importance of understanding the Metric and Apothecaries systems.
(3) Discuss ways alternate systems of weights and measures are used in Science and Health Occupations.

Related Competencies: [Related Science Competencies]
(1) Demonstrate the proper use of a laboratory instrument appropriate for the student's grade level or course.
(2) The learner will demonstrate the ability to observe
(3) Perform computations involving whole numbers and common and decimal fractions when given a problem.
(4) Measure within a given degree of accuracy when given appropriate measurement instruments.
(5) Demonstrate a knowledge of the basic units of length, mass, volume, and temperature in the SI metric system when given measurement problems.

(6) The learner will understand that the metric system is the preferred measuring system in science.

[Health Occupations 7931 Unit IV]

(1) Describe the use of the apothecary / metric systems as they relate to health care and health maintenance.

METRICS IN MEDICINE

Introduction

Metrics play an important role in a health care worker's job. More and more health care facilities use the metric system exclusively when recording vital statistics such as height, weight, blood pressure, and temperature. For instance, blood pressure is measured in millimeters of mercury and medication dosages are often calculated according to the patient's weight in kilograms. Ward secretaries often chart temperatures according to degrees of Celsius and laboratory technicians must count the number of red blood cells per milliliter of blood as part of their daily work. Metrics are here to stay! The government of the United States began the conversion to the metric system approximately 10 years ago recognizing that the rest of the world was not going to convert to our English system of pounds, ounces, inches, and degrees of fahrenheit. Metrics are more accurate measurements of weight, height, volume, and temperature. With that in mind, study the following tables. They will help you to answer the questions and do the excercises that follow. Have fun and think **METRIC!**

Conversion Tables

Weight:

Weight

lb.	Kg.	Kg.	lb.
1	0.5	1	2.2
2	0.9	2	4.4
4	1.8	3	6.6
6	2.7	4	8.8
8	3.6	5	11.0
10	4.5	6	13.2
20	9.1	8	17.6
30	13.6	10	22
40	18.2	20	44
50	22.7	30	66
60	27.3	40	88
70	31.8	50	110
80	36.4	60	132
90	40.9	70	154
100	45.4	80	176
150	66.2	90	198
200	90.8	100	220
1 lb. = 0.454 Kg.		1 Kg. = 2.204 lb.	

Height:

Length

In.	cm.	cm.	In.
1	0.5	1	0.4
2	0.9	2	0.8
4	1.8	3	1.2
6	2.7	4	1.6
8	3.6	5	2.0
10	4.5	6	2.4
20	9.1	8	3.1
30	13.6	10	3.9
40	18.2	20	7.9
50	22.7	30	11.8
60	27.3	40	15.7
70	31.8	50	19.7
80	36.4	60	23.6
90	40.9	70	27.6
100	45.4	80	31.5
150	66.2	90	35.4
200	90.8	100	39.4
1 inch = 2.54 cm.		1 cm = 0.3937 inch	

Temperature:

Temperature

°F	°C	°C	°F
0	−17.7	0	32.0
95	35.0	35.0	95.0
96	35.5	35.5	95.9
97	36.1	36.0	96.8
98	36.6	36.5	97.7
99	37.2	37.0	98.6
100	37.7	37.5	99.5
101	38.3	38.0	100.4
102	38.8	38.5	101.3
103	39.4	39.0	102.2
104	40.0	39.5	103.1
105	40.5	40.0	104.0
106	41.1	40.5	104.9
107	41.6	41.0	105.8
108	42.2	41.5	106.7
109	42.7	42.0	107.6
110	43.3	100.0	212.0
°C. = (°F. − 32) × 5/9		°F. = (°C. × 9/5) + 32	

WORKSHEET FOR TEMPERATURE CONVERSION

(Please show all work)

1- How many degrees Centigrade is an average oral body temperature of 98.6° fahrenheit? _____° Centigrade

Formula: °C = (°F. - 32) x 5/9

Work:

2- If a fever is considered anything over 100° fahrenheit, what would be the highest temperature in Centigrade that a patient might have and not have a fever?

_____°Centigrade

Formula: °C = (° F. - 32) x 5\9

Work:

3- 38.8° Centigrade is equal to _____ ° fahrenheit.

Formula: °F. = (°C. x 9/5) + 32

Work:

4- Why do you think that 32 is added to the formula for degrees fahrenheit above? _____

_____

5- The normal temperature of my Great Dane is 3° F. higher than my average body temperature of 98.6° F. What is the dog's normal temperature in °C.? _____ ° Centigrade.

Formula: °C. = (°F. - 32) x 5/9

Work:

WORKSHEET FOR HEIGHT CONVERSION

(Please show all work)

1- How many centimeters tall is a patient that is 6' 4" tall?

_____ centimeters.

Formula: 1 inch = 2.54 cm.

Work:

2- How many millimeters are in the number of centimeters that you calculated in number 1? _____ millimeters.

Formula: 1 centimeter = 100 millimeters.

Work:

3- If an airline hostess or host must be between 5'3" and 5'11" in order to be hired by the company, what is this range in centimeters? _____ centimeters.

Formula: 1 inch = 2.54 cm.

Work:

4- How many centimeters long is a ruler? _____ cm.

Work:

5- If a surgeon makes an incision that is 2.8 cm. long, how many inches is this? _____ inches.

Formula: 1 cm. = 0.3937 inch

Work:

WORKSHEET ON WEIGHT CONVERSION

(Please show all work)

1- A very heavy patient is admitted to the hospital. When he is weighed it is discovered that he weighs twice as much as his roommate who weighs 162 pounds. How many kilograms does the very heavy patient weigh? _____ kilograms.

Formula: 1 lb. = 0.454 Kg.

Work:

2- If the average weight for an 18 year old female who is 5 feet 3 inches tall is 108 pounds, how many kilograms per centimeter does she weigh? _____ kg. per cm.

(Hint: Kilograms divided by Centimeters)

Formulas: 1 lb. = 0.454 Kg. & 1 inch = 2.54 cm.

Work:

3- How many pounds are 21 kilograms? _____ pounds.

Formula: 1 Kg. = 2.204 lb.

Work:

4- Which is longer, 0.5 inch or 2.5 cm? _____

Formulas: 1 inch = 2.54 cm. or 1 cm. = 0.3937 inch

Work:

WORKSHEET ON HOUSEHOLD WEIGHTS AND MEASURES

The household measures are used primarily in the home. As this system gives only approximate measurements, it is seldom used in medicine. However, patients on intake and output orders need accurate reporting and members of the health team should know these measurements. Also, patients who must take medicine at home and others who need to administer liquids to them should be aware of these values. Use the charts below to answer the following questions about equivalent weights and measures:

TROY

STAND	METRIC	METRIC	STAND
1 Grain	64.81 mg	1 mg	1 65 Grain
1 Carat	200.00 mg	200 mg	1 Carat
1 Pennyw t	1.56 g	1-1 2 g	1 Pennyw t
1 Ounce	31.10 g	31 g	1 Ounce
1 Pound	373.24 g	373-1 4 g	1 Pound
		1 kg	2 68 Pound

AVOIRDUPOIS

STAND	METRIC	METRIC	STAND
1 Grain	64.81 mg	1 mg	1 65 Grain
1 Dram	1.77 g	1.77 g	1 Dram
1 Ounce	28.35 g	28.35 g	1 Ounce
1 Pound	0.4536 kg	453.59 g	1 Pound
1 Short Ton	907.18 kg	907 kg	1 Sh. Ton
1 Lg. Ton	1016.05 kg	1016 kg	2 68 Lg. Ton

LIQUID

minims	ml.	minims	ml
1	0.06	6	0.37
2	0.12	7	0.48
3	0.19	8	0.49
4	0.25	9	0.55
5	0.31	10	0.62

DRY

As Listed	METRIC	METRIC	As Listed
1 Dram	3.70ml	3.75 ml	1 Dram
1 Teaspoon	4.93ml	5 ml	1 Teaspoon
1 Tablespoon	14.79ml	15 ml	1 Tablespoon
1 Ounce	29.57ml	30 ml	1 Ounce
1 Cup	0.24L	0.24 L	1 Cup
1 Pint	0.47L	0.50 L	1 Pint
1 Quart	0.95L	1 L	1 Quart
1 Gallon	3.79L	3.75 L	1 Gallon

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By mastering the weights and volumes given in the household weights and measures conversions, it will be possible to convert measurements from one system to another. This process is necessary to calculate dosages and prepare solutions. When converting from one system to another, multiply to find the smaller measure.

Example: How many milliliters are in 3 drams?

1 dr = 4 ml **4 x 3 = 12 ml**

Example: How many milligrams are in 3 grains?

1 gr = 60 mg **60 x 3 = 180 mg**

When converting from one system to another, divide to find the smaller measure.

Example: How many grams are in 30 grains?

15 gr = 1 Gm **30 / 15 = 2**

Example: How many milliliters are in 6 minims?

1 ml = 15 m. **6 / 15 or 15) 6.0 = .04 ml**

Practice problems:

1- Convert the following household measures to milliliters.

Remember to change to decimals.

a) 20 gtts. _____ **Work:**

b) 3 tsp. _____ **Work:**

c) 1 1/2 c. _____ **Work:**

2- Convert the following metric measures to apothecaries' or household measures as indicated.

a) 8 Gm _____ **Work:**

b) 10 Gm _____ **Work:**

c) 75 mg _____ **Work:**

3- Indicate which of the following measurements may be considered equal by placing a checkmark in the space provided.

a) 1cc = 1 ml _____

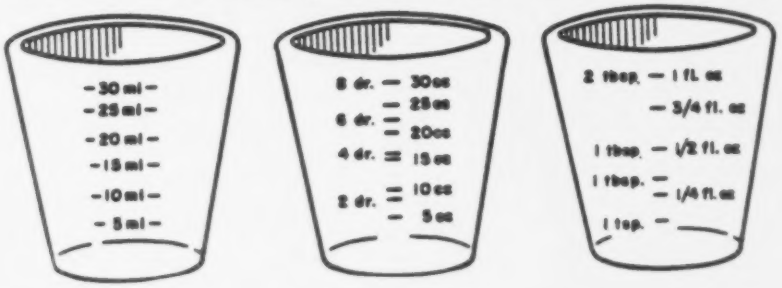
b) 1 mcg. = 1 m. _____

c) 1 L = 1 lb. _____

d) 1 ml = 1 Gm _____

e) 1 kg = 1 L _____

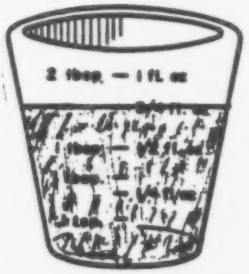
Accuracy in measuring is important in many fields and especially in medical professions. In order for patients to receive the correct drug in the correct amount a student of health must be able to use measuring devices correctly. A standard medicine glass looks like this from three sides:



As you can see, the measuring lines are divided into metrics, apothecaries, and household measures. In the hospital, medicine glasses are usually disposable and made of either clear plastic or waxed paper.

Answer the following questions regarding the measuring of medications:

1- How many minims of liquid are in this glass?



_____ minims

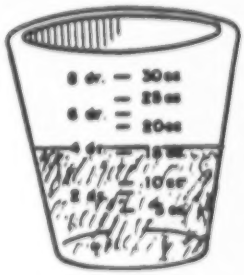
2- How many cc's is that? _____

Work:

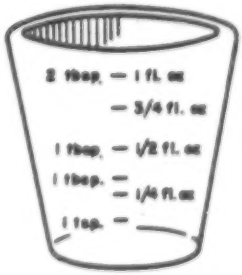
3- Shade in how much 1 tbsp. of medicine would be in this glass.

4- How many oz. of cough syrup would this medicine glass represent?

_____ oz.

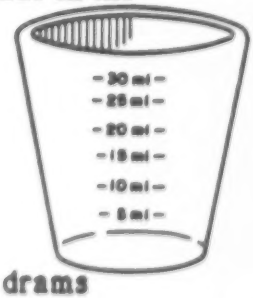


5- Shade in the equivalent of 8 dr. in this medicine glass.



6- How many oz. is 8 dr.? _____ oz.

7- If a patient is to take 1/2 oz. of a laxative at bedtime, shade in the correct equivalent in this medicine glass.



8- Approximately how many dr. are in 30 ml.? _____ drams

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Hands On Activities:

Equipment List: 1- **Thermometers (Oral fahrenheit & Laboratory)**
2- **Scales (Bathroom)**
3- **Measuring Tape (Inches)**
4- **Measuring cup (ounces)**
5- **Can of Cola (cold)**
6- **Three disposable cups**

Activity: **Bring the above equipment to class. You will need one set of equipment for every pair of students. Some of the activities are done alone and some are done in pairs.**

Single Activities:

1- Weigh yourself in pounds and convert this weight to kilograms.

Answer _____ **kilos.**

Work:

2- Convert your height in inches to centimeters and millimeters.

Answer _____ **centimeter**

_____ **millimeters**

Work:

3- Take your oral temperature in degrees fahrenheit and convert to degrees Centigrade.

Answer _____ **degrees Centigrade**

Work:

4- Convert what you drank at breakfast into ounces and milliliters .

Answer _____ **ounces** _____ **millimeter**

Work:

Paired Activities:

1- Take the temperature of three liquids: 1) a cup of cold cola;
2) a cup of WARM tapwater; 3) a cup of water at room temperature;
(Caution: Use only warm water)
Convert these temperatures from fahrenheit to Centigrade:
Answers: 1) _____ C. 2) _____ C. 3) _____ C.
Work:

2- Convert your partners weight from pounds to kilograms.
Answer: _____ kilos.
Work:

3- Convert your partners height from inches to centimeters.
Answer: _____ centimeters
Work:

4- Take your partners temperature orally. Convert this answer to degrees Centigrade.
Answer: _____ degrees Centigrade
Work:

5- Measure the liquid in all three cups. Add up the total number of ounces and convert to milliliters.
Answer: _____ milliliters
Work:

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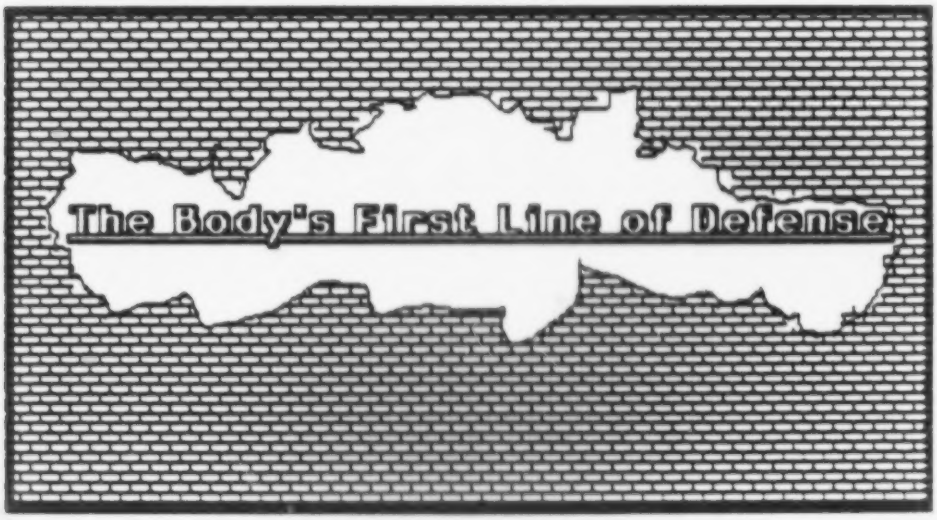

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The Body's First Line of Defense

Teaching Unit:

STRUCTURE AND FUNCTION OF THE INTEGUMENTARY SYSTEM

Training Activities:

(1) Applying experiential knowledge to learning activity.

(2) Solving problems.

Unit Objectives:

Following completion of this module and any teacher discussion the learner should be able to:

(1) Differentiate between objective and subjective observations about the skin.

(2) Name the main structures and functions of the skin.

(3) State the protective functions of the skin.

(4) Identify 5 diseases and/or disorders of the skin.

Related Competencies:

[Science Related Competencies]

(1) Describe how disease-causing organisms enter the body such as entry through water, food, air, and skin.

(2) Name and describe the major structures and functions of all the main body systems.

(3) Label and describe the major organs of each major system of the human body.

(4) List the major functions of the organs composing the major human body systems.

[Health Occupations Unit IV 7931]

(1) The learner will be able to analyze the structure and function of the bodies' systems as they relate to diagnosis and treatment of the major diseases or disorder associated with that system.

1- We have all had a cut at one time or another. Remember your last cut and describe it in as many ways as you can. (Hint: How did it look in terms of size, shape, depth, cleanliness. How did it feel? numb, burning, sharp pain, stinging, sore, hot)

Subjective: How did it feel?

_____

_____

Objective: How did it look?

_____

_____

2- A cut can be superficial or very deep. If a cut goes through all skin layers then it has cut through _____ layers.

3- The layers of the skin are called the epidermis, dermis and subcutaneous layers. Which layer is the outermost layer?

_____

4- The innermost layer of skin is called the subcutaneous layer. It contains fat deposits for reserve energy. The dermis, or middle layer is also called the true skin. It contains blood vessels, nerves, and glands. Which layer of skin would have to be injured in order for bleeding to occur?

_____

5- The epidermis, outermost skin layer is stratified and made up of epithelial cells with no blood vessels. The epithelial layer of skin goes through constant changes with old cells being worn off and new ones taking their place. The epithelial layer contains melanin. What is another word for melanin? _____

6- Skin provides many functions. It 1) Protects against pathogens or germs; 2) Regulates body temperature; 3) Contains sensory organs for pain, touch, heat, cold, and pressure, and; 4) Excretes water and salt. What ways might a burn affect the skin?

_____

_____

7- In assessing skin we use all of the senses. Color changes can tell us alot about the skin and the functioning of other body systems. Yellow skin is called jaundice and is caused by bile in the blood. What organ produces bile?

a- pancreas

b- liver

c- kidneys

d- adrenals

8- A bluish color of the skin is properly termed _____
and means a lack of oxygen in the blood. The inside of the lips and the fingernail beds are good places to first observe cyanosis. What do you think can be done for a person with cyanosis?

_____

_____

9- Dermatitis is an inflammation of the skin. What color is inflammed skin? _____ How might a person with inflammed skin describe it to you?

_____

_____

The way a person describes a problem to you is their **SUBJECTIVE** assessment. That means it is different from one subject or indivdual to another.

How might you describe a person's inflammed skin in terms of **OBJECTIVE** information. That is, how might all inflammed skin be similar when observed by the health care professional.

_____

10- The inflammation process is turned on by your body to protect itself from germs which cause infection. Five major signs of an inflammatory reaction are heat, redness, swelling, pain, and drainage. Drainage or exudate is another word for the fluid and white blood cells that are released from blood vessels to fight infection. How might we assess the inflammatory process for skin? _____

11- Pus or inflammatory exudate is made up of fluid from the blood plasma and white blood cells called leukocytes. Leukocytes surround, engulf and digest bacteria in a process that means "cell-eating". What is the proper name for this process? _____

12- Bacteria release toxins or poisons and destroy large numbers of leukocytes that eventually fill in an area with dead white cells. The combination of exudate, living and dead white blood cells and bacteria plus destroyed tissue is called _____

13- If a skin condition is contagious that means it can spread from one person to another by contact. Which of the following skin disorders are **not** contagious?

a- eczema
b- acne
c- impetigo
d- athlete's foot
e- melanoma
answer(s) _____

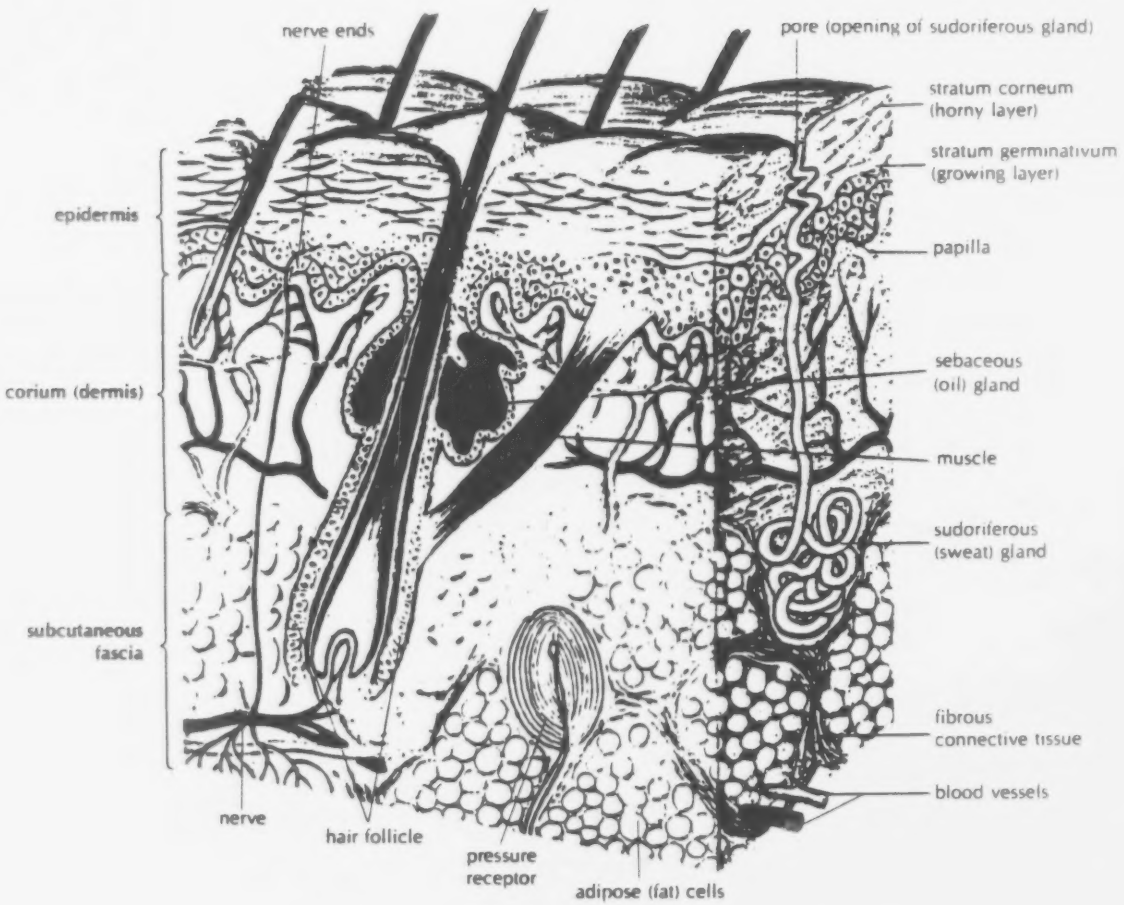
14- Characteristics such as baldness, wrinkles and freckles are passed along through genetic coding and are said to be _____

15- Circle the ways that all person's can care for their skin?

a- protect from excess sun
b- wear makeup
c- bathe regularly
d- massage the scalp
e- moisturize the skin
f- drink plenty of water
g- eat a well balanced diet
h- inspect skin regularly
i- put butter on burns
j- clean cuts and cover with a sterile dressing
k- scrub the skin vigorously
l- smile alot

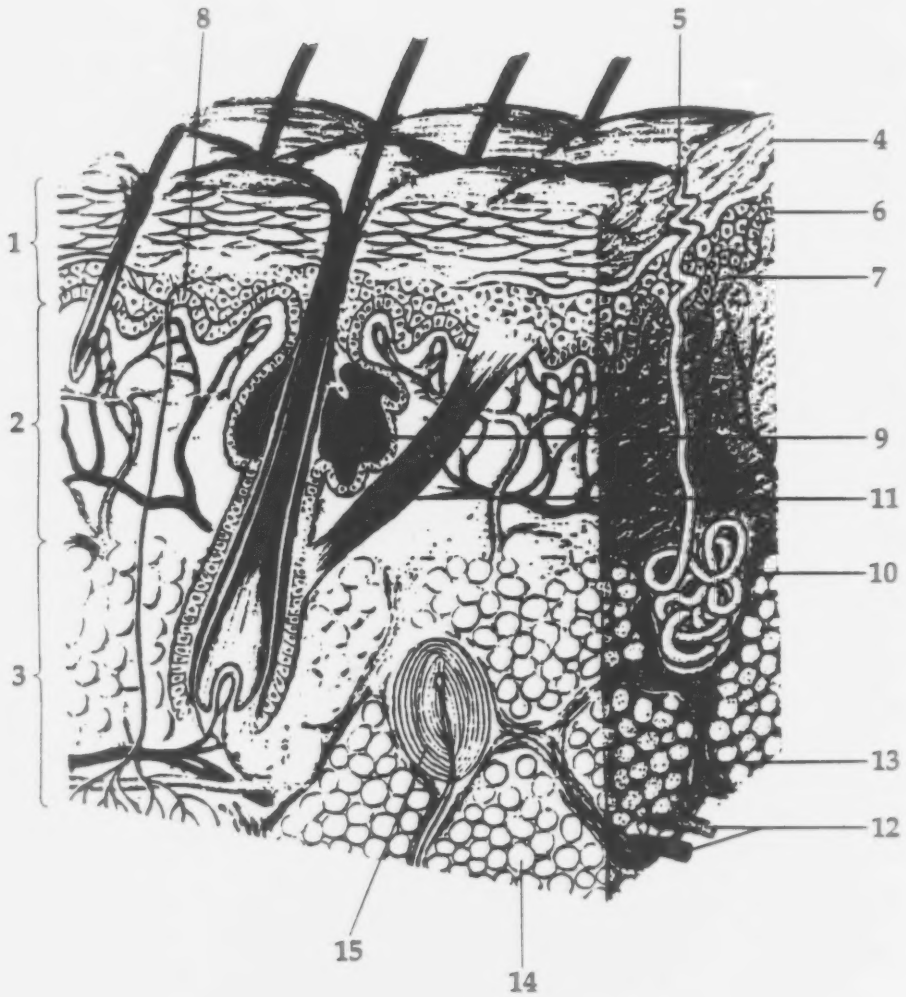
STUDY THE FOLLOWING PICTURE OF A CROSS-SECTION OF SKIN:

THE SKIN IN HEALTH AND DISEASE



Cross section of the skin.

FILL IN THE CORRECT PARTS OF THE FOLLOWING CROSS-SECTION OF THE SKIN:



Cross section of the skin.

The Body's First Line of Defense Answer Sheet:

1- Descriptors for wound:
Subjective: Hurt, Stung, Burned, Itched,
Objective: 1", open cut with ragged edges, penetrating through to muscle, oozing small amount of bright red blood, with dirt and gravel embedded. Patient complains of burning pain and itching around site of cut.
2- 3 layers.
3- epidermis (epi- means outer)
4- dermis (contains blood vessels)
5- pigment
6- skin loses ability to repel pathogens
nerve endings exposed causing pain
may lose excretory function causing fluid and electrolytes to escape (result- fluid and electrolyte imbalance)
may lose temperature regulating capabilities causing hypothermia
burned weeping area provides perfect medium for bacterial growth
7- b- liver
8- cyanosis
rest- reduces body's need for oxygen
administer oxygen via mask or cannula
treat cause
elevate head of bed to ease respiratory effort
ensure patent airway
9- subjective: itches, burns, swollen,
objective: skin rosy red and hot to touch, mild edema, complaining of burning pain and tightness, draining watery foul smelling liquid.
10- Observe, feel, smell, measure,
11- phagocytosis or leukocytosis
12- pus
13- a, b, e
14- hereditary
15- all except b and i

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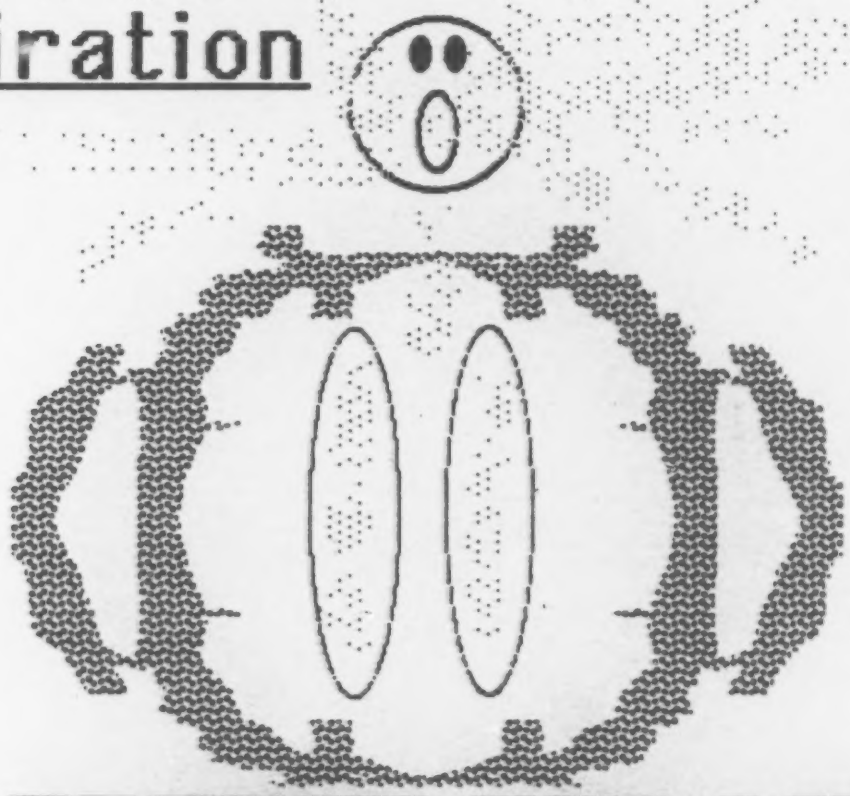
Respiration



ENERGY FOR LIFE

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RESPIRATION: ENERGY FOR LIFE

A slide tape presentation from Science and Mankind, Inc.

Training Activities:

(1) Viewing and discussion of A/V presentation.
(2) Answering related questions on worksheet.

Objectives for Learning:

Following A/V presentation and discussion the learner will be able to:

1- State the chemical processes involved in cell respiration.
2- Name 2 scientists who contributed to our present model of cell respiration and describe their experiments in terms of the scientific process (observing, measuring, predicting,communicating, controlling variables, formulating hypotheses).
3- Analyze the structure and function of the respiratory, circulatory, and digestive systems of a variety of organisms and their interdependent roles. What are the similarities and differences between these systems from simplest to most complex.
4- Explain how different forms of energy relate to each other.
5- State the role of ATP in providing energy for life.
6- Describe the basic unit of life and the source of energy for all living things.

Equipment needed:

1- Slide projector
2- Cassette tape player
3- Screen or viewing wall

Related Competencies: [Science Related Competencies]

1- The learner will understand the general structural plan of the human body is composed of various systems with specific structures and functions.

2- The learner will be able to name and describe the major structures and functions of all of the main body systems.
3- The learner will understand that life is a chemical process.
4- The learner will understand that genes composed of DNA are responsible for inherited characteristics.
5- The learner will understand that organic variation is significant.
6- The learner will have an understanding of the diversity of living things.
7- The learner will understand that the basic unit of life is the cell.
8- The learner will understand that living things may be grouped from the simplest to the most complex.
9- The learner will understand the nature of human origin and development.

[Health Occupations Unit IV 7931]

1- The learner will be able to analyze the structure and function of the respiratory system as they relate to the diagnosis and treatment of major diseases/disorders associated with the system.
2- The learner will be able to analyze the components and characteristics of the blood as they relate to the diagnosis and treatment of the major diseases/disorders associated with the blood.
3- The learner will be able to analyze the circulation of blood through the blood vessels as it relates to the diagnosis and treatment of the major diseases/disorders of the heart and blood vessels.
4- The learner will be able to analyze the structure and function of the digestive system as they relate to the diagnosis and treatment of major diseases/disorders associated with the system.
5- Analyze the cells, tissues, and organs as related to the body systems.

Science and Mankind, Inc.

Respiration: Energy for Life

If you're in a hurry ... read this first

The Program at a Glance:
Part One

The major experiments leading to our present model of cell respiration are traced, cell respiration is defined and the essential requirements for this process are examined.

1. Robert Boyle discovered that something in air is necessary for candles to burn and mice to breathe, and that this "something" can be used up, causing the flame to go out and the mice to die.
2. Robert Hooke demonstrated that there is a relationship between movement of the rib cage and the movement of air into the lungs.
3. Joseph Priestley repeated Boyle's experiments, adding a green plant, and demonstrated that a plant, in sunlight, can return to the air whatever is removed by animals. He also discovered that the gas given off by heating red oxide of mercury will support life and flame.
4. Antoine Lavoisier named Priestley's gas, oxygen. He discovered that burning charcoal and breathing animals give off the same gas, which we now call carbon dioxide. He recognized the similarities between combustion and respiration.
5. Louis Pasteur demonstrated that yeast cells, in the presence of oxygen, convert sugar to carbon dioxide and water.
6. ATP and its energy-storage properties were discovered.
7. Breathing is only one part of respiration. The chemical process that removes and transforms energy from food molecules occurs within individual cells and is called *cell respiration*.
8. For cell respiration to proceed, cells must receive a continuous supply of oxygen and small food molecules; carbon dioxide must be removed. A survey of the breathing, digestion and circulation processes in a variety of organisms explains how these tasks are accomplished.

Part Two

Many observed phenomena – survival without food, bioluminescence, certain kinds of poisoning – can be explained by understanding cell respiration and the role of ATP.

1. Energy is the ability to do work; energy in one form can be changed to energy in other forms. Energy conversions in living organisms differ from those in mechanical systems in some important ways, including temperature and the presence of ATP, an energy storage and distribution molecule.
2. The ultimate source of energy for living things is the sun. Its energy is trapped in food molecules manufactured by green plants, and distributed throughout the biosphere by means of food chains.
3. The fundamental role of cell respiration is to disassemble a food molecule (eg. a glucose molecule), releasing its stored energy gradually. This energy is transferred to and stored in ATP molecules. ATP molecules are relatively small; they circulate freely within a cell and back and forth across the membranes of most cell organelles, and with the breaking of a single bond release amounts of energy appropriate for the needs of cell activities.
4. The chemical reactions of cell respiration take place in two parts of the cell: the preliminary reactions (glycolysis) in the *cytoplasm*; the majority of the reactions within specialized cell structures called *mitochondria*. Within the mitochondria three distinct sets of reactions occur: the chemical union of a 2-carbon molecule with the carrier molecule coenzyme A; the Krebs Cycle; the electron transport chain. For each glucose molecule entering this chemical apparatus, 2 molecules of ATP are formed during gly-

(over)

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No. 104

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health risk appraisal
&
HEALTH AWARENESS GAMES

COMPUTER ASSISTED INSTRUCTION

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Health Risk Appraisal
&
Health Awareness Games

Teaching Unit: HEALTH MAINTENANCE AND HEALTH CARE

Training Activities :
(1) Operating computer equipment
(2) Working independently

Unit Objectives:
(1) The learner will be able to name the leading causes of death for their age, sex, race, and lifestyle.
(2) The learner will state what relationships exist between lifestyle and mortality rates.
(3) The learner will state the leading causes of death for at least three hypothetical persons with varying ages, races, sexes, and lifestyles.

Related Competencies:

[Science Related Competencies]

(1) The learner will have an understanding of the importance of caring for the body through proper nutrition, health, and sanitary practices.

(2) The learner will be able to discriminate between good and bad health practices.

[Health Occupations Units II & IV, 7931]

(1) Evaluate the harmful effects of alchohol, drugs, and tobacco.
patterns related to health problems and/or concerns.

INTRODUCTION

The University of Minnesota Health Awareness Games is a collection of five games on health subjects adapted for the Apple II computer. It requires 48K memory, one 16-sector (DOS 3.3) disk drive, and a black-and-white television or monitor. It does not produce printed output.

The games are lessons in a particular health area. A sixth Help lesson introduces the computer keyboard. A Menu program lists and describes the other games and allows the user to select one, use it, and evaluate it before starting another (or leaving). A Usage program displays cumulative use of the games and answers to evaluation questions. The user's interaction with the package is diagrammed in Figure 1.

Three of the health games are concerned with specific topics: risk factors for coronary heart disease (Coronary Risk), smoking (Why Do You Smoke?), and weight control (Exercise Weight). Two are more general (Life Expectancy and Lifestyle).

The major changeable health behaviors common to two or more games are shown in Table 1. Thus obesity and smoking are each discussed by four of the five games, physical activity and diet by three, and alcohol consumption by two. Coronary Risk also discusses blood pressure, and Lifestyle covers several other behaviors, such as drug abuse, automobile use, and regular breast examinations for women.

Introduction to Health Risk Appraisal

The University of Minnesota Health Risk Appraisal, Student Edition is a computer-based tool for health assessment and education. It attempts to determine; the health interventions, or changes in behavior that are most appropriate for an individual, and to present them in a way that motivates behavior change. The appraisal is conversation; that is, the computer interviews each user by displaying questions, and the user replies by typing answers. Intermediate results are displayed throughout the interview, and a printed summary can be available immediately after the last question is answered.

The appraisal emphasizes the future. High school students will find this unit most interesting as it lists the causes of death related to lifestyle for age groups.

The program is divided into three main parts. First, based on the user's age, race and sex, it determines the ten major causes of death over the next ten years. Second, it adjusts these average mortality figures according to answers to questions on health background and habits, and computes a health risk age. Finally, it assumes that, one at a time, changeable health behaviors are improved, and it uses these improved behaviors to recalculate mortality and compute an achievable health risk age. At the end of the appraisal, the user is asked evaluation questions.

For classroom use, the unit can be used to emphasize health risks: what they are, how they are determined, and how they can be minimized.

HEALTH RISK APPRAISAL may be ordered from HRM Software, 175 Tompkins Avenue, Pleasantville, NY 10570 for the Apple II and IBM computers. The unit is copyrighted by the University of Minnesota and is available for approximately $100. Health Occupations Education teachers may borrow the unit from the State Department of Public Instruction, Media Support Services, Raleigh, North Carolina.

Health Risk Appraisal Study Sheet

Prior to using the Health Risk Appraisal Software, answer the following questions:

1- What do you think are two main causes of death for a person your age and sex.

a- _____

b- _____

2- Which of the following factors do you think influences how long a person lives?

a- diet
b- how many miles you drive per year
c- how long your grandparents lived
d- habits (ie. wearing seatbelts)
e- all of the above
f- a and d only

3- Most older persons are motivated to change health behavior to live longer. However, this is often not true of younger people. Why do you think that this is so?

_____

_____

4- Cancer has seven warning signs. Which of the following do you think is NOT one of the seven warning signs of cancer?

a- unusual discharge or bleeding
b- a lump or thickening anywhere in the body
c- persistent cough
d- a wound or sore that doesn't heal
e- a sharp pain in the abdomen
f- change in a wart or mole

5- What is your blood pressure? ____ / ____

6- What do you think are three major risk factors that can be changed that can make someone live longer?

a- _____

b- _____

c- _____

7- How long do you want to live? _____ years